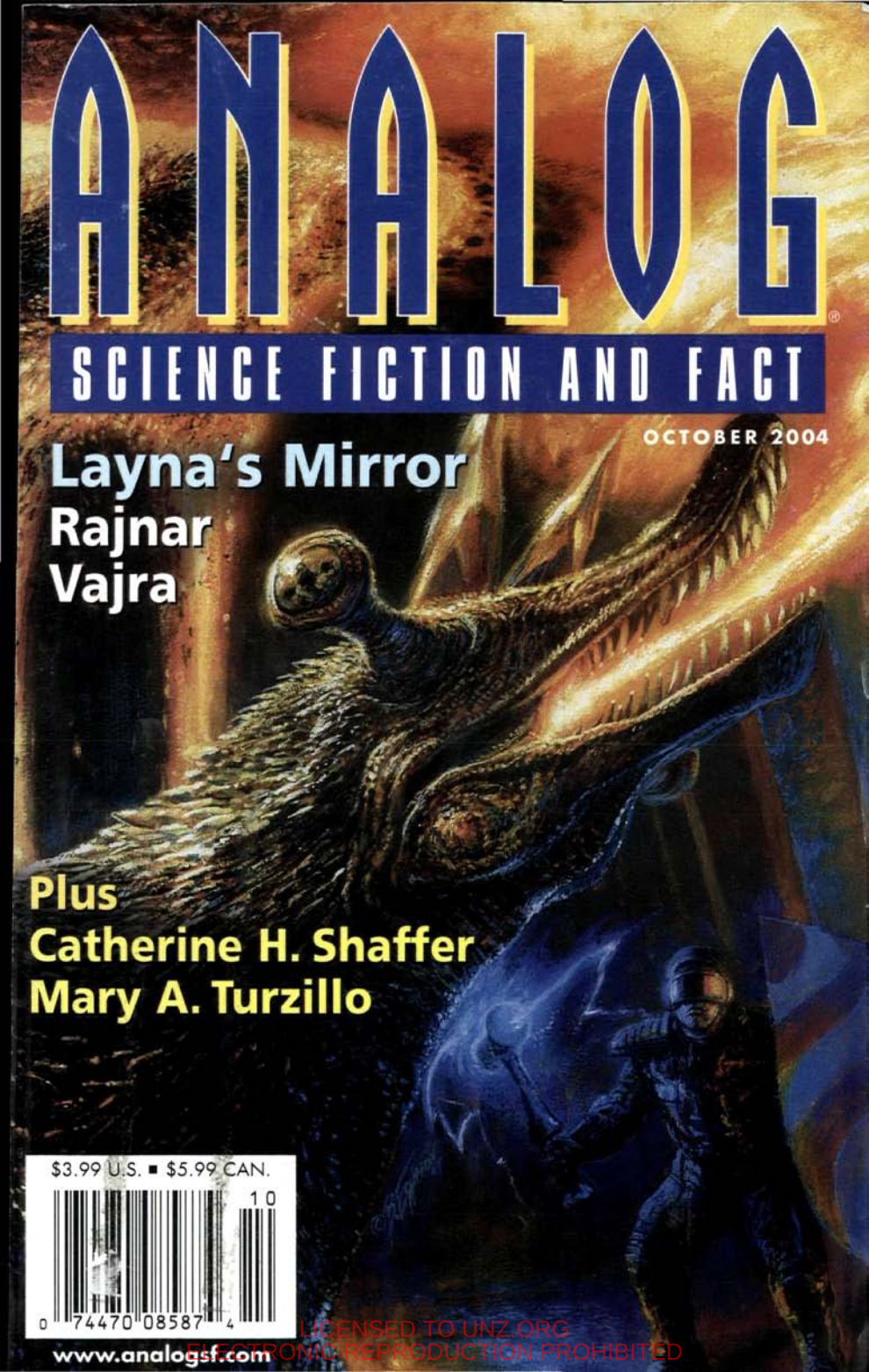

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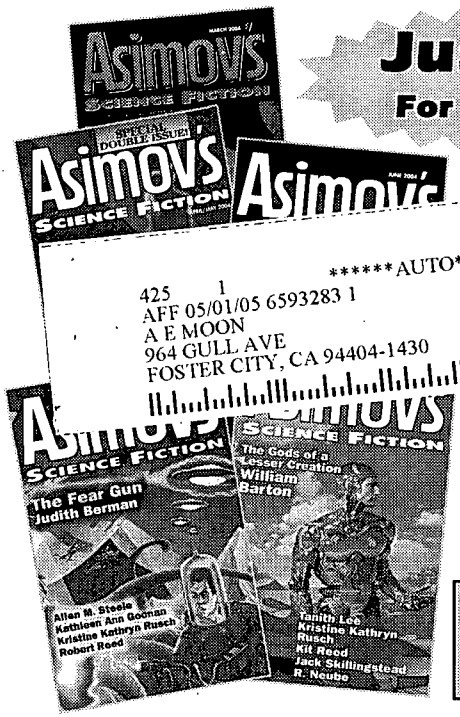

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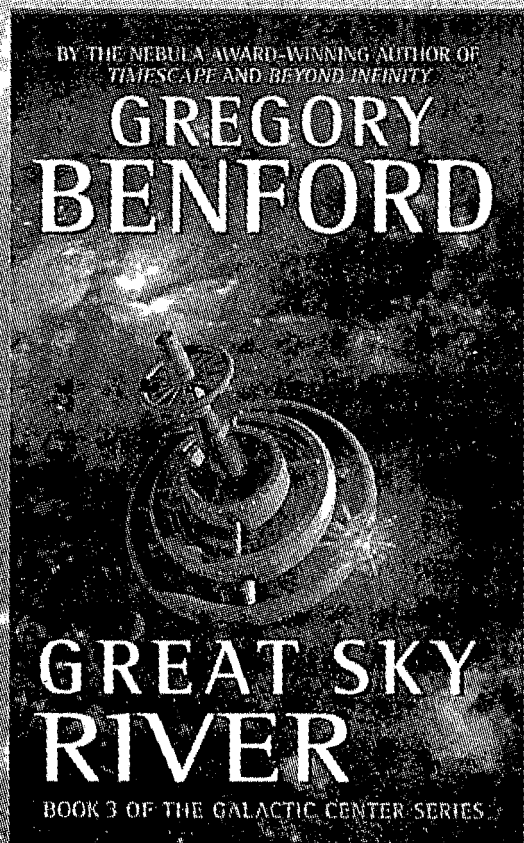

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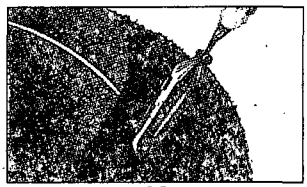

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THE VANISHING REPAIRMAN

Last month I talked about the fact that, as long as we depend exclusively on unmanned probes and rovers for the exploration of places like Mars, such missions will be very vulnerable to failure because of mechanical or electrical glitches that can't be fixed because of the lack of an onsite human repairman. But Mars isn't the only place with such problems. Right here on Earth, at least in electronics, there's a growing shortage of repairmen. That's both a technological trend and a social one, with far-reaching implications. What are its healthy and unhealthy aspects?

Given the laws of thermodynamics, owners of just about any equipment have long known that sooner or later they would probably have to answer the question: Does it make more sense to fix it or replace it? A common rule of thumb has been that if repair costs more than half what replacement would, it makes more sense to buy a new unit than to fix an old one. But recently the question has developed several new wrinkles—which, unsurprisingly, are mutually entangled. The one that provided the immediate impetus for writing this was an article in a Gannett newspaper business section about the decline of the repair profession. According to the Professional Service Association, the number of repair shops in the United States declined by some 56% in the decade from 1992 to 2002. So even if you *want* to have something repaired, and you're unable or unwilling to do it yourself, you'll find it a lot harder than a few years ago to find somebody to do it for you.

Why is that? One surviving but struggling repairman quoted in the article blamed globalization and cheap foreign labor that let things be made abroad and sold here at prices that make repair economically uncompetitive. It's true that prices of new electronic equipment, unlike almost anything else in our economy, keep going down, and outsourcing to cheap foreign labor is indeed part of the cause. But it's not the only cause. Even if everything sold in the U.S. were made domestically, prices would keep going down because new manufacturing methods make it possible to manufacture entire complicated circuits as single units, much more easily and cheaply than making equivalent circuits by assembling discrete components like transistors and capacitors.

Those manufacturing methods make some repairs not only economically not worthwhile, but logistically impractical. People who've grown up with recent generations of electronics may not realize just how much things have changed in the last few decades. They may not even know what I mean by "discrete components," so I'll digress to recap briefly.

The heart of a typical, basic electronic circuit is an electronic switching or control device. A few decades ago that was a vacuum tube on the order of a centimeter or three in diameter and several centimeters long. Other compo-

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nents such as resistors, capacitors, and inductors (coils) were connected to that to make a simple circuit with the property that when you fed one kind of signal (the "input") into one pair of terminals, an "output" signal came out another pair, with characteristics different from the input in some specific way. For example, an ideal single-stage amplifier would produce an output with the same waveform as the input, but a larger amplitude.

In a practical device like a radio, television set, or computer, the output from one stage is fed into another where something else is done to it. A typical old-fashioned table radio contained five or six stages and therefore five or six tubes; a television set some twenty or thirty. Computers didn't exist, except crude versions in laboratories; anything more would require so many tubes and associated components, and so much space and cooling equipment, that nobody could afford to build or house one. If somebody did, it wouldn't have worked very well anyway because the large distances signals must travel would make it (for us) painfully slow.

Tubes gradually shrank and then gave way to transistors. A discrete transistor does the same kinds of things as a tube, using solid semiconductors, but it's much smaller, typically a buttonlike object well under a centimeter in diameter and thickness. Several of them could be mounted directly on a printed circuit board, with painted-on lines of copper or other conductors acting as wires, so a whole radio or amplifier could be built in a much more compact space than the old tube types (which were not much smaller than a breadbox). The limits to how small such household devices could be made came to be not the main circuitry, but input and output devices like speakers and microphone jacks, and the knobs chubby human fingers needed to operate them.

Then came integrated circuits, in which the pattern of semiconductors that constitute a transistor could be made so small that several of them could be made—or grown—on a single chip of silicon. So could patterns that acted as other components, like resistors and capacitors, so the electronics of a whole radio—even a very sophisticated one—could be put in a package looking very much like a single transistor from a few years earlier. That left a lot of space inside even the smallest packages that human hands could manipulate, and researchers kept learning to fabricate even tinier circuits: microchips smaller than the daintiest fingernail but containing thousands or even millions of transistors and their associated circuitry. That led (I resist the temptation to say "ultimately," because it's nowhere near) to the present ubiquity of powerful desktop and even palm computers, and household appliances full of "smart" control devices. Most people these days, even

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ones actually working on such devices' innards, seldom think in terms of transistors or capacitors, but rather in terms of whole chips, containing huge amounts of circuitry, as irreducible units. Transistors and the like are there, in quantities that would have astonished even our recent ancestors, but they're invisibly small and irrevocably attached to many, many others. If one critical transistor fails, there's no way to replace it; you *have* to replace the whole chip. Fortunately a chip now costs many orders of magnitude less than an equivalent assemblage of discrete circuit elements like transistors; but it may still cost enough to make an appreciable dent in many people's wallets. What makes it tolerable is that the chip can do so much more than any discrete-component unit of manageable size.

The practical consequence of all this, returning to the fix-or-replace dilemma, is that a problem that once would have been fixed by replacing a tube costing a few dollars can no longer be done that way. The whole unit, or at least the whole chip containing the tube-equivalent, must be replaced. The chip may only cost a few times what the tube would have, but unless the user knows enough to feel confident about replacing it himself (which many people don't), he'll have to pay a repairman to install it. Assuming he can find one, the repairman has overhead to pay—things like space rental, equipment, utility bills, insurance, training to keep up with the constant onslaught of changes—and so must charge a substantial minimum (typically $50 to $100) even for small, easy jobs, just to be able to stay in business. These days repairmen are finding it harder and harder to find customers willing to pay those amounts when they can spend a little more and get a complete, brand-new unit.

And then there's the fact that the new unit is unlikely to be a replacement; it will, like it or not, be an "upgrade." In ways, this is good; by the time you want or have to buy a new Something, you will surely find that something just like it is no longer on the market; the same money, or less, will buy you (whether you want it or not) a new version that does a lot of things that the old one couldn't. What could possibly be wrong with that? What's wrong with that, as anybody who's done much with computers and also tried to maintain and use stored data over long periods knows, is

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that the New Improved Model will almost certainly be incompatible with some old records that you still need to use. Computer manufacturers who gleefully encourage Latest and Greatest Syndrome—and find millions of customers willing to go along with it!—just don't seem to get this simple point: The purpose of sophisticated data storage and retrieval systems is to facilitate storage and retrieval of data. It is *not* simply to show off what a snazzy system you can build. An "upgrade" that adds features you don't really need, but cuts off your access to records you've spent years constructing, is a big step down, not up.

Relatively few people seem to care about long-term storage and access to data, and surprisingly many leap at whatever the newest thing is just because it's the newest thing. So another factor contributing to the decline of the repair business is that more and more customers never even reach the point of making a fix-or-replace decision. They decide to replace a device long before it breaks, simply because a new fad has come along and they have enough surplus money to follow this one, too. So it becomes even harder for repairmen to find customers, and therefore even harder for customers to find repairmen, and therefore . . .

And so the spiral continues.

There are, of course, good sides to all this. Many, many people can now afford useful things (as well as silly, frivolous things) that the richest kings of a century ago could not have bought at any price. A somewhat smaller number can even afford to buy new versions of those things every time one comes along or a whim strikes, and to simply toss the old one aside. But there are not-so-good sides, too. The main concern of that article in the business section, not surprisingly, was the decline, possibly into eventual extinction, of a particular kind of business. The main concern of people in that profession, also not surprisingly, was the threat of losing their livelihood and having to find a new one, possibly at an age when that won't be easy. But there are bigger problems, too. The galloping tendency to throw away rather than fix is flooding landfills with wasted materials (which will often be replaced with newly mined or refined ones) and toxic substances like cadmium and lead. And it encourages a whole mindset of cavalier wastefulness that tends to color every aspect of people's lives.

And sometimes the tendency to build things with the assumption that they will be replaced rather than repaired seems to go considerably farther than necessary, in ways that are rough on do-it-yourselfers and others who do have to watch their budgets, and disturbing to those who simply don't like unnecessary waste and its consequences. I'll close with just a couple of examples from my own experience.

I used to do most of my own electronic repair, so I know quite a bit about how things were built and fixed in some past periods. I've done less of it recently, because I now usually find it easier to come up with the money to repair or replace something than the spare time to repair it myself. There's also the fact that the ways things are built have changed so much that I'd need to devote a fair amount of time just to reeducating myself enough to know how to work on new units. (Hey, even the people who make a living at it often complain that they spend a major part of their time doing this!) But consider these two cases:

(1) A few years ago I had an intermittent problem with one output channel on an audio tape deck. I did enough tests on it to discover that the problem was a defective jack, which I should have been able to buy for a couple of dollars and replace in a few minutes—if it had been designed sensibly. Instead, I found that instead of being a separate, easily removable and replaceable part, the jack had been made as an inseparable part of a circuit board that cost $90 to replace.

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(2) I've just replaced a television set whose only known fault was a vertical linearity problem that, on any older set I've ever worked on, would have been easily remedied with a few minutes of twiddling two controls easily accessible on the back of the chassis. This one had no such controls, and repairmen told me that the only remedy would involve surgery costing at least $90 and more likely $150—approximately the cost of a comparable new set. It's nice that I could now get a new set for so little, but I shouldn't have had to. I should have been able to fix the old one myself, quickly and at *no* cost—and providing the adjustments to do so would not have added that much to the price.

There are certainly big advantages to the current system, but there are other considerations, too often ignored. I realize that finding the optimum balance among them is not a trivial problem, but examples like these—and I've seen plenty of them—make me question whether we've chosen the best of all possible compromises. ■

Ninety percent of the politicians give the other ten percent a bad reputation.

—Henry Kissinger

He who serves his country well has no need of ancestors.

—Voltaire

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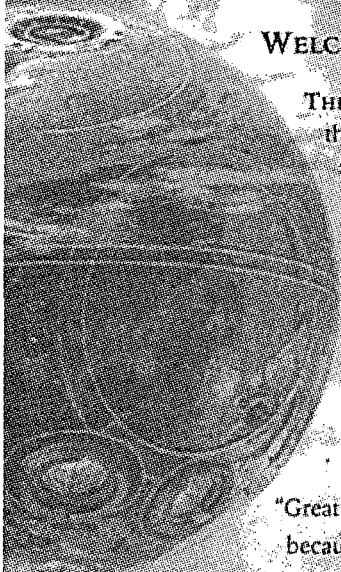

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LAYNA'S MIRROR

Rajnar Vajra

Appearances can be deceiving—to put it mildly!

Ghouls, demons, and gods: these are the absurd ways the Sasaru are remembered. Now that the last and best one has finally joined her long departed brethren, the obscenely distorted legends haunt me like ugly ghosts. I am free now, I suppose, but I don't feel free. On this bright morning, my thoughts are shadows. Today, Aetum forgive me, I wish the Sasaru had drowned in the ocean of time without leaving even a ripple.

"It is truly exquisite, Marq," Layna murmured. "Lavish and splendid, my lord. So clever, the way you've made it pirouette autonomously."

Her praise was more than I deserved and her courage almost more than I could bear. No hint of suspicion touched her delicate face. How long could I keep doing this to her? Once again, I'd put my whole heart into a project, but scarcely half my skill. Theoretically, only one form of beauty could restore her fully, but I am not one who entrusts his life to theories.

She moved closer to the sculpture, reaching out with a graceful hand as if to touch it, then catching herself.

It wasn't designed to be touched. The sphere, three feet in diameter, was a glistening wonder rotating slowly on an unobtrusive glass stand. Metallic dusts ran liquidly over the surface in swirling rivulets of molten gold, glittering black, bronze, and raw copper. Between these lurid streams, underlying translucent colors and textures teasingly appeared: glassy seracs of ruby and rubellite, rounded moraines in blue tourmaline and amethyst. Sasaru chemistry, Sasaru metallurgy, Sasaru electrostatics. While humans were still cowering in trees, the Sasaru were mastering recombinant spacetime.

Here was my finest piece yet, but I'd made certain my beloved couldn't do more than admire it.

"So lovely," she sighed. "If only . . ."

I braced myself, fear tightening the small of my back, and struggled to keep my lying voice steady as the ice outside my castle.

"Is it all you were hoping for?"

"I—I believe so."

"How might it be improved?"

"I see no flaw, my lord. All I see is how hard you've labored and I love you for it. Anything lacking is my fault, not yours. My heart keeps yearning for . . . something and all I know is that your creations come closest."

I tried to smile. "But this one, once

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again, falls short?"

"Not in artistry! Your work always calls to me, and this masterpiece has the clearest voice thus far."

"Thus far. So you wish me to assay another?"

"My precious Marquindrol! How silly I am to put you through such travail! But each sculpture you make is more beautiful than the last. Somehow closer to—"

"Enough. I will attempt the grandest project yet. After a brief rest."

She turned away from me then and faced the granite wall adorned only with an ancient carving of the Ascending Spiral, sacred icon of Aetum's Law. "I, too, am weary, dear one." She was almost whispering. "The body endures but my soul shrivels. Someday it shall blow away like a dry leaf." Even the back of her head held a breathless grace.

"Don't say such things!" When she talked such talk, my own soul withered. "Life remains a beautiful surprise. Come, we shall take our breakfast in the Lookover this morn. The clean glory of the world will water your spirit."

"As you desire, my lord." She turned toward the sculpture one last time but her pale blue eyes glistened with paler crystal tears.

The curved window-wall of the Lookover room provides the second finest view in my home, the Castle In A Mountain, perhaps the second finest view on Earth. To the east and west, the Himalayas—enrobed in alabaster half gilded by the rising sun—were spread before us; we were above all but the noblest peaks. To the south and far, far below, azure glints of Phewa Lake stabbed through the lowland's morning mist.

At my urging, Layna nibbled on sweet strawberries of apple size and took desultory samples of the rich black bread with fresh yak butter that my Yetis had lovingly prepared. She lacked sparkle; winter's door was scarcely open, and she was already pallid as my hopes. Perhaps the Giver was failing like everything else.

"Have you ever tasted such fruit, my lady?" I said with cheer so palpably false it resounded in my ears like sarcasm. "Doesn't their smell evoke childhood's summer days?"

A faint line appeared between her eyebrows. "I remember no childhood."

I tried to go on smoothly, as if I hadn't made a fool of myself. "Still, what do you think of—look! Now *there's* something unexpected!"

Two foreign mountaineers were laboring to scale the icy cornice that was the Lookover's window-wall from the outside. Our wall was, in truth, a Sasaru video screen whose image was tiled via optical cells growing on the cornice's surface. The ice itself was invisible to us, so the climbers appeared to be floating ten feet out from the window, clinging desperately to nothing, struggling to drive climbing screws into very thin air.

"My lord," said Layna, "you must act. See how their chests labor and their limbs shake? They are too weak to continue. Ah! That poor wretch just dropped his sledge. If it hadn't been strapped to his wrist, it would have been lost forever."

Naturally, these interlopers were in trouble! Vist, the old lord, had deliberately installed the Castle behind a sheer slope, treacherous with overhangs, and so windy it was patently too dangerous to climb.

"What would you have me do?" I asked.

"These men have reached their limits. They will die if you fail to bring them inside."

"*Inside?* You expect me to reveal our secrets to these . . . futile invaders?"

"I expect nothing, lord. But such is my wish."

Within me, guilt wrestled good sense while I strove to hide all signs of warfare from my face. All too soon, guilt triumphed. I'd denied my lady's paramount desire for so long, I couldn't refuse her this, no matter the consequences.

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"Umtash," I called softly.

"Near you as ever, lord," my majordomo responded. This Yeti was petite for his kind; his height, seven and a half feet, scarcely exceeded mine and his simian brown eyes were so alert they seemed burnished. Aside from my old Sasaru master and teacher, Vist, Umtash was the most competent and intelligent being I'd ever known.

"You see the specimens outside the window?"

"Even these small eyes could hardly miss them, Lord Marquindrol."

I raised my eyebrows at the formality. "Please do as my lady requests and bring them to me."

The Yeti's cloudlike pelt of long fine hair, bronzed by the sunrise, bristled with its usual efficiency, yet his manner was uncharacteristically stiff.

"Your command pleases me, my lord. How do you wish us to handle the matter?"

"Gently but firmly. Respond to any questions with affable shrugs and uncomprehending silence."

"*Bonjour, Messieurs*," I said in the first European language that sprang to mind, guessing the two men were European. Layna and I were seated with our backs to the outside brightness; it wouldn't do to have our visitors inundated with certain details at first. I didn't offer to shake hands and reminded myself not to smile too widely. Not that I expected to smile.

The mountaineers were standing before us—teetering was more apt—dressed in long polyester underwear. My Yetis had stripped them of climbing gear and outer clothing. Their unstable bodies and glassy expressions suggested puppets.

At my gesture, servants put forth chairs and each man fell into his as if his strings had snapped. They smelled of snow and stank of exhaustion.

When I'd seen these fools outside, their balaclavas and dark goggles had made them seem alike as two eggs in a nest. To my eyes, they still appeared similar: lean, inches short of a mere six feet, and their faces were equally raw and chapped.

Now, as petty variations revealed their individuality, my seamless detachment from them began to crack.

The balding man whose tawny, closely cropped hair was still pebbled with pellets of frozen sweat had blond eyebrows, aqua eyes, and a short, dripping, ruddy beard. He was perhaps two snowflakes taller than his companion and a decade older. He could barely keep himself awake.

The other was more interesting because he was swiftly retrieving his wits. This one had shoulder-length sodden black hair and somber eyebrows as sharply peaked as my mountain. His nose was swollen and flakes of frozen blood were melting under the nostrils; his dark stubble suggested a false beard drawn in charcoal. He swallowed repeatedly while his close-set gray eyes fluttered between Layna, Umtash, the spectacular view, and me.

"*Je*," he uttered with painful slowness; his voice had a hollow, oboe-like timbre. "*Je . . . ne parle*—"

"Never mind, sir, I hear America in your accent. Kansas?"

"Nebraska. Thank God you speak—my French isn't so . . . Jesus! I can't *think*. What's the matter with me?"

"Exposure and hypoxia. Considering the circumstances, you are doing remarkably well. Take your time."

"Is any of this *real*?" he blurted, wiping his nose with the back of a hand, his eyes resting for a moment on a classic Sasaru wall-tapestry woven entirely in various shades of tinted gold.

I shrugged. "I wouldn't know; only fools believe they grasp reality. Still, if you do not find my environment believable, I hope you at least find it hospitable?"

"Hospitable? It's warm in here. And the air breathes so . . . thick." Both true,

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compared to conditions outside. He shook his head and sat up straighter. His eyes suddenly seemed better focused. "But where the hell is 'here'? What kind of place is this? Who are you people? And what are *those*?" He'd gruffly whispered the final two words; but his index finger aimed at my servants spoiled all confidentiality. "I thought I was hallucinating when they—did they really—?"

"Sir," I forced myself to chuckle, "ask no more! When you roll too many questions down the slopes of uncertainty, you risk an avalanche. I am Lord Marquindrol. You may call me Lord Marq. My companion is the Lady Layna. You are guests in my refuge, *Yngrol*, which translates neatly as 'Castle In A Mountain.'" I didn't bother interpreting "Marquindrol," literally "lifted servant."

"Those individuals you indicated," I continued, "are Yetis, something of a local legend I believe."

"*Yetis*? Are you *kidding*? God. I don't understand any of this, but I'd better thank you for . . . saving our freezing butts. Can those—Christ!—Yetis understand what we're saying?"

"Certainly not." I was proud of the way my staff subtly shifted their heads to an angle less suggestive of listening. I was prouder of Layna; she didn't even blink at the outrageous lie.

The mountaineer took me at my word. "Could you please thank them? On our behalf?"

I was increasingly impressed with this man's vitality and poise. "Certainly."

"Damn, wish I had my camera! You know, I could've sworn they were *running* up and down sheer walls of—no. *That*, at least, must have been a delusion!"

"Doubtless. Your name, sir?"

"Sorry, guess my manners aren't awake yet. It's like yours: Mark. Markus Bowman."

"And your companion?"

"Heinz. Dr. Heinrich Weiss, I should say. With a 'W,' not a 'V.' Now *he* speaks French. He's Austrian, but his English is pretty damn good. Hey, Heinzy! You with us today?"

Weiss appeared, if anything, drowsier. The flickering of his eyelids drew attention to his unusual, blue-green irises. As an artist, I approved how they ambered inwards as if his pupils were rusting.

As a man, I disapproved of how his groggy, bloodshot gaze kept resting so heavily on Layna.

"Good *morning*, Dr. Weiss," I said.

He opened his mouth, but what emerged was a croak.

"Don't attempt speech yet." I turned toward my majordomo and switched to a language our visitors couldn't know. "Umtash—two hot Darjeeling teas with lemon, honey, and healing herbs, if you would. Please handle the matter personally. Our guests must be dehydrated."

The castle's larder probably contained neither lemons nor honey at that moment, yet it only took Umtash ten minutes to return with the requested brew.

I gave my servant an admiring nod; even I couldn't operate the Giver as quickly. "This should ease your throats, gentlemen. And if you're up to it, Mr. Bowman, perhaps you can ease my curiosity while your partner recovers. Why in Aetum's Name were you assailing *this* part of my mountain?"

The American shook his head. "We weren't, we just . . . wound up here. Christ, I must've been really out of it. I don't remember—"

In a heartbeat, he turned three shades paler and stared out the window, his face stricken. "Oh my God!"

I frowned. "What is it?"

"*Six* of us started up yesterday morning and—"

A cold premonition blew through me. "What happened to the other four?"

"I don't know, damn it! They're not here?"

"Definitely not."

"Shit! Then we've got to find them! Right now!"

"Sit back down, sir, and describe exactly what happened. At this moment,

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you're not equal to searching for your own feet."

"But someone has to—"

"Sit. Recount. Any detail might help."

"Ah! So *you'll* go looking for them? Good. That'll work. Those hairy Sherpas of yours . . . All right. We were teamed as three pairs, working up in parallel lines—".

"Starting where?"

As Bowman used the north bergschrund and other landmarks to define their initial position and their route upwards, I studied the man's face, surveying the landmarks of his character.

He was scowling now, the black eyebrows so close they almost made a Roman "M." His jaw-set and the lines around his mouth revealed both strength and weakness. Here was a mind perpetually fixed on high achievement. And blind to possible costs.

". . . So up to that point," he was saying, "everything was ideal and then—"

"And then?" breathed Layna. Unfortunate. I hadn't decided to let our guests know *she* spoke English.

"Freezing fog rolled in from nowhere. No warning at all! We moved close together, but soon we couldn't even see our own hands, let alone each other. We set some anchors and waited, thinking the fog would dissipate, but we started getting too damn cold. Finally, we decided we'd better travel blind and try for a narrow ridge we'd noticed earlier."

Bowman squinted, as if trying to pierce the mists in his memory. "Heinz told everyone that when we reached the ridge, we had to be extra careful where we put our feet. Maybe they didn't listen! The whole thing was covered with little sastrugi—you know, hard dry snow . . . shaped like Spanish roof tiles? Do you—"

"Calm yourself, sir. Take a full breath."

He didn't seem to hear me. "Heinzy's idea was that we'd feel our way along to the lee of the ridge where we remembered a pretty fair spot to make a snow cave. Somehow, the doc and I got off line. We missed the ridge and lost track of the other teams and suddenly they didn't answer our yells—or our phone calls . . ."

I glanced at Umtash, who gave me an almost imperceptible nod. The mountaineers' sat-phones wouldn't be used without my permission.

I cut off Bowman's monologue by raising a hand. "I understand your concern."

"*Concern*? I'm worried *sick*. And every moment counts! Come on! You know enough. *Now* will you start looking for my friends?"

Feeling Layna's gaze on me, I spoke to Umtash again in a tongue far older than Sanskrit.

"Send four of your brethren on this search. Bring any survivors here at once."

"Yes, lord. Should we use those-who-sniff?"

I'd been chewing on that question myself. The creatures were hard to awaken, progressively harder to control, and very dangerous despite the Truce.

"Rouse only one and use it for no more than two hours. If it hasn't succeeded by then, return it to full sleep and rouse another. Continue this as long as necessary; but do not, under any circumstances, disturb Gurm."

"Very wise, my lord."

While Umtash distributed orders, I distributed assurances that the search was about to begin.

"Anything I can do to help?" Bowman asked. His relief was embarrassing. Having handed over the baton of responsibility, he slumped back in his chair, grinning as if the rescue of his companions was assured.

Layna hadn't missed this rapid and irrational mood shift. She and I traded troubled glances, but I noted a light in her eyes that had been missing for far too long.

"Kindly finish your story," I requested quietly.

"Sure. And thank you. For everything.

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Wonder where my phone—"

"You spent the night hanging from ropes?"

"Yeah. Not the best accommodations, but we made it. When I get home, swear to God, I'm making a shrine for my thermos."

Even with hot liquids available to them, these men had proved themselves sturdier than they looked. The human body suffers at eighteen thousand feet. To reach the Lookover by sunrise, they must have spent the night exposed to the elements at twenty-two thousand or higher. And then they'd begun climbing!

"Explain why," I said, "you were traveling *upwards* this morning. Surely you weren't attempting the summit?"

"The summit? No way. We just wanted to get back down to our last camp. But—and I know this sounds crazy—a couple hours before dawn, when we started to descend, we found that the ice below us had gone rotten."

"What?"

As he nodded, water droplets showered from his hair. "You know: when the crust goes thin and the snow beneath softens up. The crust becomes a skin holding everything together and sooner or later, everything's going to slide off. Not safe."

I just stared at him.

"Yeah, I know it's impossible. You don't get rotten ice at this elevation. Maybe if this mountain was a volcano—hell, I can't explain it, but that's what happened."

I was aghast. The explanation was staring him in the face. As my heart sank under a fresh load of guilt, his voice seemed to drone on endlessly.

"We tried to go down. Even had a picket pull out on me, which hasn't happened in twelve years of expedition climbing—damn thing managed to clip my nose! So we had to go up where things were still solid, hoping to cut over and down before long. But we got too damn tired. I remember thinking that I had to keep climbing no matter what . . ."

I felt ill. I'd been so focused on my latest project and Layna that I hadn't followed Vist's standard precautions. Yesterday, in my main workshop hundreds of feet below the Lookover, I'd opened external vents to release steam from my kiln without confirming that no bloody *tourists* were about. The steam had obviously caused the freezing fog, and dissipating heat from the kiln had penetrated the mountain, weakening the cover from below. All my fault.

Finally his ramblings slowed enough for me to interrupt. "What was the purpose of your expedition?" My voice came out far harsher than I'd intended.

He tilted his head. "Purpose? Partly for our next book. Heinz and I have done three so far. But mostly it was the good challenge. This mountain is amazing when you really get to know it." For an instant, his gray eyes gleamed. For the first time, I felt some sense of kinship.

He sighed, shifted uncomfortably in his seat, and continued. "It's been climbed before, of course, but we were going to try a brand new . . . Christ! I'm blathering." He rapped his forehead with his knuckles. "Maybe I'm still out of it. The only important thing right now is the search!"

"Patience, sir. Patience." I turned toward my other guest. "Feeling any better, Doctor?"

Weiss cleared his throat, coughed, and muttered in a husky voice, "Vat—what do you mean? I'm a little . . . did *I* drink this tea? I meant to. I've just been sitting here, thinking what a nice *Gasthaus* this is. Such a view! Gorgeous! But the *fräulein* is even lovelier. Are those strawberries on that table? *Wunderbar!* Perhaps I should say '*fruchtbar*'!" He giggled at his own joke, then his forehead wrinkled in childlike puzzlement. "Where did you get such strawberries? Do I know you, *mein Herr?*"

I glanced over at Layna. Her glow from the novelty of meeting strangers

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was increasingly layered with concern.

I smiled at her reassuringly. Weiss merely needed warm food, water, and a week's rest. His eyes were wide open now, but dreams were floating across them. The man was, in effect, sleep-talking.

"I'm Lord Marq, Doctor. This is Lady Layna."

"Mark? Mark's right here . . ."

"Would the two of you," I said to Bowman, "care to join us at breakfast? Aside from what you see, I can easily supply hot oatmeal, muesli, or farina. If you'd like something heartier, I can offer a rasam soup that would make you praise your favorite deity for the lowly lentil."

The black-haired man perused the breakfast sideboard and gently shook his partner's shoulder. "Come on, Heinzy, wake up. Food. Gotta stoke the old furnace. Hunger is hunger in both German and English, right? You'll feel better."

The word "furnace" made me wince but only Umtash noticed. Yetis helped the guests rise and I took Layna's hand, and we also stood. For the first time, Weiss's expression showed a glint of awareness and a dash of fear. Bowman's eyes widened as we approached and his head tilted back to keep my face in view.

"Whoa! Why is everyone here so *tall*? No wonder you've got that deep voice! I'm starting to feel like a midget in an all-NBA conven—" His eyes abruptly widened; he'd finally gotten a clear look at me. "Jesus! No offense, um, Lord Marq, but are you . . . human?"

"No offense taken, sir. And the answer is yes. I'm human."

He obviously and understandably didn't believe me.

Breakfast was a blessedly short ordeal. Bowman joined his partner in gaping at Layna—perhaps he was trying to avoid seeing me. He relinquished boorishness only long enough to occasionally peer impatiently toward the distant entrance. Weiss simply stared at my beloved, chewing away in a kind of bovine stupor.

I was grateful when the meal was over and could politely suggest that the visitors allow Umtash to lead them to a lavatory and then to a room they would share. I hadn't ordered any such room prepared, but trusted my majordomo to handle the obvious.

"A unlikely tale Mr. Bowman related," Layna remarked when we were again alone, "and a doleful one in implication."

I nodded. "Indeed. Almost certainly these two men are all that remains of their party."

"Otherwise I would regard their visit with unalloyed pleasure. Are all men these days so strange and marvelous?" I hadn't seen her face this animated since she gave up Tadvana dancing six decades ago.

Nevertheless, irony lifted my eyebrows. Marvelous? To me, they only represented a terrible threat and an impossible dilemma.

When he returned, Umtash conducted me to the room where the mountaineers' gear had been stored and I examined everything carefully.

At first, it all seemed standard: boots fitted with spiky crampons, full-body harnesses, prusik slings, day-packs, assorted carabiners, coils of rope, medical sensors. . . .

The packs, too, contained typical accoutrements: maps, fire-starters, compasses, headlamps, and knives with matte-finished blades so they wouldn't reflect sunlight at an inopportune moment. Also ice-screws, water bottles, food, thermos bottles, a camera, pitons in a dozen sizes, flukes, rescue pulleys, etc.

But the Kernmantle ropes were unexpectedly light. And the crampons, pickets, ice-screws, and even the hammer-end ice-axes were all made of an unfamiliar translucent plastic rather than metal.

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I chewed on my shortcomings, disliking the taste. Once, I'd kept abreast of mountaineering technology. Of late, I'd thought of nothing but Layna.

By that strange luck that so often befalls fools and the overly arrogant, my guests had brought nothing reflective into my domain. I counted my unearned blessings and let duties call me away.

The mountaineers slept through the entire day and night.

Next morning, as I'd expected, neither could get out of bed. Their trauma was developing with the sluggish inevitability of a bruise. My staff nursed them well, patiently bringing liquids, food, and bedpans as the Yetis deemed necessary.

Layna and I visited twice together—she alone once, to my dismay. Bowman's eyes were raccooned, ringed with dark bruises from his broken nose. He was impatient with weakness and too eager to receive good news about his friends. I had none to impart, but he still seemed illogically optimistic. Weiss was feverish and confused.

The searchers, aimed by Bowman's directions and guided by those-who-sniff, had been transmitting hourly identical reports: no sign of the missing climbers. Still, my mountain is large and riddled with crevasses; altogether, well over a hundred square miles of surface to search. So far, those-who-sniff had behaved impeccably but on four occasions I reminded everyone to avoid overconfidence. Perhaps I should have reminded them a fifth time.

On the following morning, Weiss was awake and reasonably alert but a trifle too feeble to arise. To my surprise, he knew where he was and even addressed me by name. Doubtless his partner had explained matters. Weiss asked how the "investigation" was progressing, but his manner showed that he'd already made a realistic prognosis.

Bowman, on the other hand, was foolishly hopeful as ever. His convalescence was impressive. He insisted on joining the search party immediately and I had to explain that even if he were perfectly fit, none but a Yeti could keep up with Yetis on a mountain.

He accepted this with passable grace, declaring that he was at least prepared to join us at table, after he'd washed up.

Twenty minutes later, he entered the Lookover half supported by Umtash's daughter and chief assistant, Dhorga. He shook her hands away to walk the final few feet to his chair unaided. As he sat, he took in the carved ceiling and the empty tables as if seeing the room for the first time. I wasn't expecting his greeting:

"Flush toilets and toilet paper! Hot water! Electric lights! You've got a helluva set-up here, folks!"

"I'm glad you appreciate our amenities," I said dryly.

"Any word on our friends?"

"Not thus far."

His face fell and its mirth drained; perhaps reason was finally breaking through. "Damn. I thought for sure you'd have found them by now. You're not giving up, are you?"

Layna's face was sweet with compassion. "Never fear," she said with a touch of pride and a whisper of pain. "My lord never surrenders. How are you feeling this morning?"

"Worried. And a little dizzy, to be honest. But by God, I'm starving!" As he gazed at her, his demeanor softened. "Thanks for asking, Layna." He turned back toward me and scowled. "Where the hell did your hairy servants stash my gear? I've got to call my wife—she'll be frantic by now. And after that, I'd love a shave if you've got a razor and mirror handy. Hey, and I need my camera! Mind if I help myself to one of those pastries?"

I encouraged him to eat by passing him a bowl filled with dhobini berries, but ignored his other requests for the moment. If he wanted a shave, someone else would have to wield the blade. I didn't suffer mirrors in my Castle. Dis-

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tracted by food and Layna's presence, he didn't press the issue.

My lady helped by subtly engaging him in talking about himself. Less skill than hers would likely have sufficed.

Bowman had always been drawn to mountains. In high school, he'd become a dedicated nature photographer and an enthusiastic alpine climber. His pictures had won awards and, according to him, garnered international notice.

Twelve years ago, he'd been at Harvard working toward a career in contract law when Heinrich Weiss, who was apparently well known in mountaineering circles, approached him. Dr. Weiss invited him to be the official photographer on a major expedition to scale G3 in Pakistan. Bowman agreed to go although it meant taking a leave of absence from school. He became infected with what he referred to as "the expedition bug" and never returned to Harvard.

Halfway through our meal, the one-sided conversation was shattered by a squealing howl so assertive it made the silverware rattle. I knew this howl had issued from the dens, half a mile beneath us. If it was that loud here . . .

"What the hell was *that*?" Bowman sputtered.

Layna gripped my hand, squeezing tight, and I couldn't fault her for reacting; my free hand had instinctively clenched the heartstone hanging from its steel chain around my neck.

I tried to keep my voice tranquil and sure. "We've been using specialized animals to help search for your companions, sir. 'Snow-gryphons,' if you like. They can become surly if not treated with meticulous care. From the, ah, sound of things, I'm afraid that one has been woken a bit abruptly."

"Yeah? If all hell was breaking loose, I bet it'd make a noise just like that." His uneasy eyes scanned the entrance. "Trouble?"

"What we heard was but a mating call." A piece of dishonest honesty.

"Oh." He tried to fake a dauntless grin. "Well, it didn't attract *me*."

Now that I'd reassured my guest, I could settle down to some proper fretting. That howl might have awakened other beasts, and if Gurm awoke . . .

"If everyone will excuse me," I said, "it might be prudent to confirm that all is well."

Layna released my hand very reluctantly. As for me, I didn't want her to let go.

The wounded Yeti was traumatized and embarrassed, but he was not one to waste time in pointless apology.

"I have ill news, lord, and ill news, and more ill news."

"Sit on the bench and explain after I tend to your shoulder."

"No need, lord. This small mischief will heal in time."

"Don't argue, Thar, and don't move. When I'm finished, report."

I moved closer to him, stepping into a widening pool of the remarkably iron-rich blood that Vist had provided to Thar's people as an aid to fulfilling their . . . higher duties. Too much flesh and bone had been torn away; without my aid, the Denmaster would be crippled for life. I called forth my healing cells and laid my mouth over the gaping hole in his arm; with a wound so open, I wouldn't need my built-in hypodermic needles.

Vist had given *me* modified teeth and specialized semi-autonomous cells, leukocyte-sized organic machines, to preserve both Layna's health and, for Layna's sake, my own. But with my Sasaru master centuries gone, I applied my gifts according to my judgments, not his.

The cells, coated with energy-providing glucose, tasted sweet as they poured back and forth, streaming medical data into my cranial nerves—which tickled as if alien mice were whispering into my ears—and accepting my subvocalized instructions. The process, as always, made me drool. My saliva ran

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down Thar's chest, mixing with his blood while the Yeti sat utterly still, his trust in me absolute.

Umtash's grandfather, Bhardun, had once confided to me the ancient Nepalese secret of handling pain: total acceptance. Any resistance, he'd claimed, leads to an ascending spiral of torment—an odd, but apt, example of Aetum's Law of Evolving Cycles. When Vist had genetically altered a random Nepalese tribe into his Yetis, a millennium before my birth, his victims had surely needed that secret! My own transformation had been such torment that—never mind. Certainly, I see merit to Bhardun's system but have never mastered the technique. I was in awe of Thar's composure.

Still, I expected my patient to follow orders and remain silent until the healing cells had done what they could. I was wrong.

"Lord, the missing outsiders have been found."

I ran a sleeve across my mouth; it came away soaked and stained red. To talk, I had to stop working. "Alive?" I panted. The healing process was laborious; the latest sculpture had depleted me, making the required concentration difficult.

"Dead, my lord. Their frozen bodies were lying in a deep crevasse east of the Heavy Portal. They'd apparently been standing on a ledge and it broke free. Near the bodies, we found slabs of sastrugi-covered ice that had been further coated with a thick layer of rime. On the slopes, an extra gram can kill, lord."

And a heavier burden of shame for me; the rime must have resulted from my freezing fog.

I sighed. "Where are the bodies now?"

The Yeti was silent for a second and I could almost taste his chagrin along with the blood still clinging to my tongue. "Dharg, the old one who sniffed them out, consumed them before we could stop him."

"Bloody Thain!" I cursed. "All four?"

"Yes, lord. We eventually regained control, but by then, Dharg had become covertly alert. After returning him to the catacombs, he proved unexpectedly eager to mate, breaking away from us long enough to mount another. We subdued him, but the female he had been attempting to penetrate awoke with a frightful cry."

"I heard that cry. Loud enough to disturb Aetum." I gathered my courage to ask the question. "Was it enough to disturb Gurm?"

"That is the final evil news, lord. Our old enemy woke up angry and more bestial than ever. He was unresponsive to the Trucestone and to our blandishments and he took a piece of me for nourishment before he burned his way outside. The hole he left remains in the wall near the armory. If he hadn't been so avid for escape. . . ."

This information was so appalling, I wanted to shout at my patient for not warning me immediately; but complaints had never altered Yeti nature. They no longer even remember the archaic Nepalese word for "emergency."

But *Gurm* was loose! Which meant the Denmaster had been lucky. Even in passing, the monster could have easily removed Thar's entire arm or his head, or rendered his entire body a charred ruin.

"Did any other creatures stir?"

"Many, lord, but we quelled their restlessness with the Trucestone and sweet music."

"Music? Someone has been astute this day! Extremely well done!"

This calamity might have been a catastrophe. Some brilliant Yeti, probably Umtash, must have decreed that musicians with instruments stand vigil in the dens against a mass awakening.

Still, the situation was desperate enough. After a too-brief recovery period, Gurm could burn his way back into the Castle at will and I couldn't prepare

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a warning system in less than a day. And until the monster-sized hole he'd made in escaping was patched, Gurm could simply saunter back in! This urgent matter would also require my personal attention, and would also demand lengthy preparation.

Hurriedly, I returned to Thar's wound. By the time his shoulder was acceptably restored, I was numb from exhaustion and tension. The new bone would be soft for weeks and the arm would swell and discolor. Still, I was satisfied; my brave servant would eventually be whole. Unless Gurm returned to finish his snack.

The lights seemed to dim, and I may have swayed a trifle. I barely heard the Yeti's calm thanks as I staggered to the nearest lift.

I couldn't afford recuperation time. Upon my orders, Umtash organized a team to search for the monster outside and a second team to guard the hole. This required weapons be issued; most had been sealed in Vist's armory for a thousand years.

My Yeti sentinels were given Blunt Swords and Twisters and, although it terrified me to do so, I let the first team take the Smooth Shield, by legend fabricated by Almesh O'Rayn himself. I issued the strictest command to never allow the Shield *anywhere* near Layna. Umtash handed me the weapon only I could use since it was personally attuned to me, that unmatchable sledge: Gloudin's Repeating Hammer.

The next difficult decision brought me to the guest quarters.

"Gentlemen," I said, "I fear we have a problem."

Bowman was pacing the room; he stopped to stare at me. Someone had used the Giver to construct clothes in the mountaineer's size and every garment was sable—the Yeti color of hope. This irony tasted bitter.

Weiss, also dressed in black although still resting in bed, opened his eyes, glanced at me, then bolted upright. Empty plates skittered off his breakfast tray and one shattered on the floor. His expression reaffirmed what Umtash had warned me about and I'd forgotten: my face was still smeared with Thar's blood.

"Jesus!" Bowman exclaimed. "What the hell happened to you? Are you hurt?"

"No. As I was saying: we have a problem."

My guests glanced at each other; Bowman raised his eyebrows questioningly and Weiss shrugged. The older man turned to me and asked in a voice clenched against disaster, "You've found our friends, then?"

"That's not the immediate issue. It occurred to me that your expedition probably set up a base camp somewhere below."

Bowman hissed like a leaky pressure valve. "Sure, but the team down there isn't set up for search and rescue, if that's what you—"

"Where is this camp? I mean at what elevation?"

"Nine K. Feet, of course, not meters."

I had to stifle a groan. "How many members of your party are down there?"

"Seven men and three women, last I looked. Why do you ask? I've been dying to call and let them know we're okay. I've been *begging* your damn monkeys to bring me my phone but they must've flunked Charades. You and me have got to have a talk about our . . . status here."

"Later. We have a more pressing urgency and I need your cooperation. Right now, your satellite phone is in one of my pockets. Don't reach out yet. First, I desire an agreement: you will tell your people that you and the doctor are safe, and then strongly warn them about something; but I must insist that you don't mention us or explain where you are. Pretend poor reception if you must. Is that acceptable?"

The American smiled thinly. "Maybe, just maybe I understand. You and your servants are from somewhere *else* aren't

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you? Another world? Another dimension? Am I getting warm?" He peered at me quizzically from under his dark brows. "You're from Planet Garbo and you want to be left alone? Okay, we owe you big time, so I'll cover somehow; but what am I supposed to warn them about?"

"Tell them a dangerous animal is on the prowl. A giant snow-leopard. It isn't far from the truth. In fact, one of the 'gryphons' I mentioned earlier has escaped. They are aggressive. This one prefers the heights, but at nine thousand feet, your companions may be in mortal peril."

Bowman mouth twisted dubiously. "They have rifles."

"Perhaps even if they had a cannon . . ."

"Jesus! Throw me that phone!"

Already, it was too late. About the time the phone was in midair, Umtash was entering my Library with a bag full of frozen human fingers and toes—all that remained of seven men and three women. Gurm has always been a prodigious but finicky eater.

A week passed before the visitors had recovered their vigor. They might have become nuisances at that point, asking questions, or worse, trying to explore. The uninformed can come to grief in my Castle in a hundred ways, and with Gurm loose no one had leisure to chaperone.

By then, however, my guests had learned the fate of their comrades. Layna had insisted I tell them and one power she'd retained from her previous life was persuasion. I'll never understand how gentle blue eyes could become so fiery. . . .

Both men were too bereaved to leave their room save for meals, when servants would fetch them. Even then, my guests might have balked except that they lacked means to communicate refusal.

Bowman was particularly crushed; twenty of the severed digits in Umtash's grisly bag had belonged to his wife. As I'd seen repeatedly in his face, he was a man who hurled his spirit at success; he found no strength to accept such loss.

Neither could I. My simple act of carelessness in the workshop had begun this tragedy, and then I'd compounded it with ruinous decisions. I should have known that those-who-sniff had become too undependable to be trusted.

Now, my folly had caused death and suffering, and everyone I cared about was imperiled. And I couldn't put aside the terrible knowledge that time would only worsen Layna's condition. No, I couldn't find any more peace than Bowman.

At least my foresight in concealing Yeti linguistic competence was proving itself; the mountaineers conversed freely around my servants. Every night I'd suffer through a verbatim report, but so far, my guests had talked mostly of their misery.

Of course, they'd noticed that Layna was getting paler daily. Their discussions on the subject became increasingly disconcerting:

Bowman: I feel guilty as hell, Heinz. My wife just *died* and it's eating me up . . . but whenever I close my eyes, all I see is that lady's beautiful face. And I keep wondering what kind of, um, arrangement she has with that walking nightmare who runs this place. Jesus! What kind of sick bastard am I?

Weiss: Don't blame yourself, my friend. In the darkest hour the spirit most craves a light. And wan as she is, Layna is *leuchtend* . . . luminous, *nicht wahr?* I often wonder—what might she think of us? Compared to the others here, a pair of midgets or kobalds, eh?"

Bowman: Any idea yet what's wrong with her? Still considering anemia? Or what was it you said? Lupus?

Weiss: If so, never have I of such a case heard. Right now, Marcus, we can only make undereducated guesses.

Bowman: I don't think you'd like my guess. And no, I'm still not ready to talk

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about it.

Such discourse complicated my heart. It left me resentful, yet my responsibility for their situation bonded me to these men with distressing power. During meals, it was impossible to keep steeled against their palpable grief—I had too much of my own. The joy Layna had shown in seeing new faces and hearing fresh voices had dimmed to embers. Half the time, she was mired in personal despair she cloaked bravely. The other half she wasted in valiant, and futile, efforts to console our visitors.

To make the intolerable worse, Gurm was *still* missing; I didn't dare search for him with those-who-sniff. I prayed the senile monster was hibernating after his ten-course meal, but the many legends about his capacities had arisen for good reason.

Using the Giver's ability to reassemble molecules, I had long since repaired the escape hole—a grueling four-hour job because the Giver's power is seasonally dependent—but that was petty compared to the next project: filling the Castle's shell with a thin layer of my own messenger cells.

For most of each night, I sat alone, my tongue touching various walls, commanding my special microscopic troupes to migrate to the outer surfaces and report back, bucket-brigade style, any new breach. If the beast burned through, I would know it before long. But the cells had a limited lifespan outside my body and needed nightly replenishing. After a few days, I began to imagine that the Castle was my true body, and my organic structure merely an oversized microorganism standing guard within.

An uncomfortable microorganism. I slept no more than an hour a day and only fifteen minutes at a time, and carried Gloudin's Hammer everywhere.

The Hammer was a refinement of the Sasaru field weapons of old that used powerful force fields as if they were cannonballs. The Repeating Hammer was designed as a handheld weapon, but it wasn't intended for a hand as feeble as mine. The accursed thing was *heavy*!

Mounting anxiety rendered me inept; every task took double the time allotted. Obviously, the monster pacing outside our small circle of light was the chief source of that anxiety. Still another rested in a sheath on my belt where, with tremendous reluctance, I'd placed the Smooth Shield's activating cylinder.

What an effort to keep it there and not use the Hammer to smash it into uselessness! I was terrified that somehow I'd be forced to use it when Layna was nearby—inspiration for those nightmares that ravaged my un-refreshing naps.

After a week of this, my eyes felt as if they'd been splashed with hot solder and invisible needles kept torturing the back of my throat. And Gurm was waiting and waiting, and my concentration was slipping. . . .

On the tenth morning after the monster's escape, the weather in the lowlands shifted. And, in strange coincidence, overnight, the Castle conservatory had become resplendent with blooming crocuses, bringing me surprise and color but no joy. Umtash had apparently arranged a private spring of his own, likely for my benefit.

Emotionally, I felt the unexpected crack in winter's grip, even here among the permanent glaciers and snows around us. The world was going into premature labor, and its water was breaking. Far below our windows, rainshowers scrubbed the lower air, leaving it clean enough to see the island in Phewa Lake where a renowned statue of Varaha the Boar acted as economic fertilizer for the sprouting gift shops of Pokara City.

How I longed to be down there, perusing the crudely made souvenirs or walking barefoot through some grassy meadow—Layna at my side—without

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this unrelenting remorse and responsibility. But even in the lowest valleys all the grass was frostburned and sere.

False spring but my regrets were germinating nicely. My guests, finally weary of remaining room-bound, wished to wander the Castle freely. After I used Gurm as an excuse to deny their request, Bowman asked if they should then consider themselves "prisoners"; he made the quotation marks with four fingers. I explained that we were all "prisoners" until the threat abated, which was why the electromagnetic lock on their door would be activated from then on.

That statement garnered comprehensible hostility and its logic received the contempt it deserved, but I was adamant. I did agree to return most of my guests' climbing gear, a concession which failed to ease our strained relationships.

Inside the Castle, the Giver took advantage of the seasonal anachronism and began pulling through relatively warm breezes from the lowlands, although not for their warmth. The perfume of fresh, oxygen-rich air was a partial anodyne for my ever-increasing fatigue, but it also carried a faint tang of man-made corruption.

Two days later, my world began crumbling.

I'd been in the Lookover most of the night, gazing down on the fluffy, star-painted tops of clouds floating by. I'd finished my chore of infusing the walls but was simply too tired to move. What was Gurm waiting for? I'd tried endlessly to reach him through my heartstone, but the amulet remained cold and silent. After so long, was the monster still capable of intelligent communication? Had his natural radio transmitter remained functional?

The dawn, and Layna's entrance, caught me off guard.

She'd dispensed with those elegant silk scarves that had shrouded her neck since fall; that neck was so dear and familiar, it never occurred to me how an outsider might . . . interpret it.

Our visitors arrived scant minutes later.

Bowman took one long, dark look at Layna. "What are those markings on your throat, Layna?"

"What markings?" she asked, gazing at me questioningly while examining her neck with her fingers.

I cursed myself for a fool's fool. She had no way of knowing about the infusion imprints, and I couldn't explain them without exposing her vulnerabilities.

"There are," I said carefully, "several pairs of red dots on your neck, my lady, but they are of no consequence." Then I tried to warn her with my eyes, but she wasn't listening with hers.

"Red dots? From you?"

"We shall discuss this later." My tone held a finality crafted to preclude further questions.

The mountaineers traded looks I disliked but couldn't fathom; certainly they weren't pleased by my evasiveness. Weiss chewed his upper lip, fingers stroking the silverware. Bowman leaned far forward in his seat, searching my face with eyes narrowed by suspicion and perhaps some fear. What I didn't understand was the faint glint of pity. His clenched fists, however, were crouched on the table like predators about to spring.

What meaning had *he* read into those marks?

An awkward moment. I became aware that Umtash was standing directly behind my chair and other servants were drifting closer to our table as if by accident. Bowman noticed the calm Yeti faces and slowly sat back, his intense expression subsiding into sullen neutrality.

When breakfast was served we all pretended that nothing had occurred, but mistrust radiated from our visitors. Bowman ate silently, gazing mostly at his plate, snatching occasional worried peeks at Layna, who was worriedly

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watching him. Dr. Weiss seemed to be chewing doubts along with his bread.

"Lord Marq," Weiss suddenly blurted, "I've noticed that many of your walls have carvings of one sort or another."

"What of it?"

"These ceiling reliefs are particularly elaborate, *nicht wahr?*"

The Lookover's ceiling was a rich rose quartz with inclusions of pure gold. I'd spent thousands of hours grinding and polishing to create the historical scenes decorating its surface, but had finished long ago. I hadn't really looked at the thing for ages.

"I prefer a nicely adorned dining room," I replied mildly, hoping he'd drop the subject.

"Such craftsmanship! The details are small, but don't some of the figures up there resemble your Yetis? And some appear built along your lines, eh? Tall and thin. Same back-tilted ears and . . . teeth."

Damn! "Obviously."

"*Ja*. And those peculiar animals directly overhead, the ones your, ah, relatives are riding? What are they supposed to be? Sea serpents? Creatures from forgotten myths?"

The "relatives" he mentioned were no relatives of mine. Reluctantly, I glanced upwards and saw my depiction of the drowning of Lwindermur Island and the astonishing rescue of King B'haid and his court as related by Lord Vist. My skills had evolved in the decades since this work was completed; many of the forms were insufficiently expressive—perhaps another task awaited me when this crisis was over. . . .

"Those 'sea serpents' are merely whales, Doctor," I claimed. "That species exists to this day. Deep-sea fishermen spot them occasionally, but they have become rare."

"Whales that look like giant snakes with flippers? Here on *Earth*?"

"Certainly." His probing was becoming increasingly irksome.

"Ah! So if they've become rare, once they were more common, *nicht wahr?* How long ago was that?"

How long ago had I become such a dullard? Evidently Gurm wasn't the only candidate for senility! Clearly, Weiss had been panning the ceiling for nuggets of information, and my incautious words had supplied him with an entire mine.

The ramifications made me grind my teeth—an ugly sensation ever since Vist had applied his skills to my mouth. Through sheer inattention, I'd offered Weiss an alternative theory to add to Bowman's delusion that I wasn't human. My guests now had a choice of believing me an extraterrestrial or wondering if sometime in Earth's antediluvian past, various now-forgotten species had roamed this world and I was a stale leftover. Of course, the theories could be combined. From my incautious words it was at least logical that if my "relatives" were indeed from another world, they hadn't arrived here *recently*.

One aspect of this misconception of my nature had been troubling me for some time. If I ever allowed these men to depart, they might feel obligated to expose my existence. For all they knew, millions of my kind remained tucked into various dark corners of the world and we might have malignant plans.

I could not afford to leave them with such doubts and now I'd compounded them. Therefore, before I could free them, I'd have to reveal yet more!

Carelessness: that enemy whose cloak is an absent mind. Being careless with my furnace had destroyed lives; being careless with my speech would make it necessary to destroy my policy. I could afford no more such lapses; Layna and I each had our weaknesses.

Weiss, who was scrutinizing my face, softly repeated his question. "When were such whales common? Will you answer me, Lord Marq?"

Why put off the inevitable? I met Weiss's eyes with an openness that made him quickly look down. "That depends on how you answer a question of

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mine. Tell me true, *Herr Doktor*: are you and your companion men of your word?"

He raised his head and eyebrows but his reply was simple. "We are."

I nodded. "Then I will answer you, but only if both of you promise to reveal nothing about my lady, my servants, me, or this place after you depart my Castle."

Bowman grunted. "Why not? As if anybody would believe us."

I hadn't considered that aspect, but it made no difference. . . .

"You have our word," Weiss added quietly.

"Then I confess to being deceitful. The forms above us aren't cetaceans."

Layna looked at me in surprise and gave me a sweet smile. "I am glad you've chosen to finally speak, my lord. Do not our guests deserve a helping of history with their meal?"

Weiss flushed with pleasure and gazed at my lady with adoring gratitude; but for me, "deserve" was a troubling word. I'd never confessed to her my role in forging the first link in the recent chain of tragic events. Knowing her, she would blame only herself; my negligence had been the hammer, but I'd wielded it while working on a sculpture for *her*. Now, "deserve" made me worry how much she'd deduced.

"Very well." I smiled back at Layna as tenderly as I knew how despite my qualms. "Your desires are as commandments to me, beloved. Thus I will unfurl the sails of our secrets and let destiny blow us where it may!"

My poesy was rewarded by a twinkle in her eye.

For an instant, my heart filled with delight. Then I remembered Gurm. "Dr. Weiss, if you seek knowledge, some carvings here are far more relevant to our current dilemma than the frieze above our table."

"Where?"

"Kindly rise and go study those shapes above the entryway."

Weiss followed my directions. Somewhat to my surprise, Bowman remained seated, his eyes distracted as if he was in a lost world of his own.

"Extraordinary!" the doctor remarked when he returned. He seemed a bit shaken. "Surely *those* animals never existed on Earth. What are they supposed to be, *Drachen* . . . dragons?"

I wished they'd never existed on Earth! "I suspect they were the inspiration for the concept of dragons. These days," I continued grimly, "their bodies aren't so sleek; they've become rather encrusted over the centuries."

"You mean . . . *mein Gott*! Are you saying it was one of those horrors that massacred our friends?"

Bowman bolted from his chair and was halfway across the room by the time I sighed, "I'm afraid so." At the entrance, the mountaineer glared at the terrifying examples of Sasaru zoology I'd portrayed with Vist's guidance. When he came back, his eyes were the color of steel, and as opaque.

Yet my heart went out to him. How would I feel if Layna had fallen into Gurm's jaws? The idea was beyond comprehension.

"Those creatures," I stated quietly, "are the ancient enemy and current ward of the Sasaru."

Doctor Weiss was staring at his friend; when he turned toward me, his brow was still furrowed with concern. "Ward? Sasaru?"

"Eons ago, Doctor, two intelligent species, the Sasaru and your 'Drachen,' evolved simultaneously on a distant world. In one Sasaru language, that world was named 'Ro.'"

"So you're some kind of alien after all?" Bowman asked tensely.

"I am *not*," I gritted, "and neither are my Yetis. But the carvings here depict various life forms from Ro and illustrate historical events from that world. Such events can be forgotten or misremembered, but somehow their . . . bones never quite dissolve. Do we not live in a universe of gravity, time, space, matter,

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and consequences?"

Weiss was scratching under his red beard and gazing thoughtfully at my servants. "This, I do not grasp. You claim these scenes happened on another planet and yet the carvings show beings akin to you and beings akin to your Yeti *Diener*, but then you tell me—"

"In my case and in those of my servants, the resemblance is artificial."

Bowman stared at me with something colder than horror in his gaze. "You mean, once you were *normal*?"

"Tactfully put."

"And somebody changed you," he said, ignoring my sarcasm, "into one of those—what did you call them?—Sasaru?"

"Not exactly, sir. Not even Lord Vist, the Sasaru lord it was my honor to serve, could make me into a true member of his species." I frowned, internally debating how much to disclose. "Life on Ro didn't follow the evolutionary path of life here."

I'd captured at least Weiss's full interest; his eyes glistened. "What was different?"

"Are you aware that human scientists have speculated about the possibility of life being painted on a silicon canvas rather than a carbon one?"

He shrugged. "Silicon-based life, *gewiss*. Old news."

"Still, have you ever considered the idea of a creature evolving with *both* silicon- and carbon-based attributes?"

The doctor tugged his beard. "It seems, ah, *weithergeholt*."

"Farfetched indeed. Ro is a most unlikely planet, even aside from the development of compound metabolisms. In all their travels, the Sasaru never found another world with two sentient native species."

I sensed that Layna was watching me with increasing surprise, but I didn't dare look back. I wanted no questions about her until I'd invented some good responses. In truth, I was becoming surprised at myself, and a bit alarmed. Why was I giving away this much?

"Intelligence itself may be a rarity," Weiss conceded. "But you say two species. What of the carvings above us of those hirsute, ah, *Untermenschen*?"

The question was a fair one, but it left me uneasy and I wasn't sure why. "The *drol* were apelike creatures given mental augmentations by those lords who desired servants. My Yetis are humans given physical augmentations to make them more effective servants. In a fashion, the Sasaru and the 'dragons'—the *Givvern*, which means 'those-who-sniff'—were complementary opposites. The Sasaru were largely carbon-based with siliceous aspects. Their enemies were the reverse."

I knew why *this* topic was making me uncomfortable: it made Gurm seem closer. At least Bowman had finally stopped glowering at me.

"I take it," Bowman said quietly, "that your Sasaru beat the dragon?"

"More or less. The lords developed refined technology and advanced weapons while those-who-sniff learned to make their bodies almost indestructible and grow . . . internal weapons. The Givvern have an ardent survival instinct; they crave existence as a starving man craves food. That instinct nearly ended them. It made them extraordinarily territorial and as they became more sophisticated, their conceptualized territory included all of Ro. So one day they attacked their main competitors.

"At first, they had the advantage and the Sasaru were hard-pressed. Then engineer-artists such as Almesh O'Rayn created weapons potent enough to fight back and Sasaru engineer-warriors, led by Queen Gloudin, who was reputedly almost as tough as a Givvern herself, went hunting. In the end, a truce of sorts was declared."

"What are these 'internal weapons'?" Weiss asked thoughtfully.

Under the table, Layna laid a hand on my thigh for comfort or perhaps warning. Still, I saw no point in not answering.

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"Those-who-sniff modified their own bodies to concentrate digestive fluids into acids capable of burning through—" I waved my hand around "—almost anything except the silicon wax lining their digestive tracts. And they learned to voluntarily excrete an enzyme that makes this acid burst into flames upon exposure to oxygen."

Bowman frowned. "Fire-breathing dragons?"

"In a sense. Also, in their obsessive introspection, they happened upon a theoretical technique for enormously extending their lives."

Weiss jabbed a finger toward me. "What technique?"

"Taking naps. Long ones. Altering themselves so they could eat tremendous meals and then sleep for decades. Physical inactivity would allow them to focus their energies entirely on regeneration and rebuild their bodies from the inside out. But they didn't dare try it because—"

Bowman's forehead wrinkled. "Are you claiming these monsters *learned* to hibernate? It wasn't instinctual?"

"Due to their semiconductive nervous systems," I said, "the Givvern have attributes similar to computers. In a real sense, they can reprogram themselves."

Bowman stared. "What? You mean their brains are a bunch of organic transistors or something?"

"'Organic transistors' at least brushes the mark. Their biology has strengths and one major flaw. Over time—considerable time—their . . . operating systems become increasingly corrupt." I'd stretched the analogy to the point of distortion, but it would serve. "Perhaps no Givvern on Earth has retained more than a primitive intelligence. Still, they're as physically formidable as ever. Perhaps more so."

Weiss shifted in his chair. "And such fearful creatures are nearby? And one of them is loose?"

"Not just any one, I'm afraid. Somewhere outside lurks their old king, Gurm, the strongest and worst of the breed."

Bowman's face was fully alive for the first time since he'd learned about his wife. For the moment, anxiety, resentment, and perhaps curiosity were eclipsing sorrow. His eyebrows suggested mountains again rather than storm clouds.

"Tell us more about that truce you mentioned," he demanded.

I hesitated but his imperiousness was easy to forgive. "The lords had their chance to eradicate the Givvern. But Almesh O'Rayn was a Sasaru with broad vision and a tender spirit. He fashioned artifacts that allowed his people to communicate directly with their enemies. At a safe distance, mind you."

"Electronic translators?" Weiss hazarded.

"Radio transmitters that O'Rayn named *patmaquar*—'heartstones' in English—tuned to that frequency those-who-sniff use to communicate with each other. The Givvern are, in part, natural transceivers."

Bowman shook his head, more in wonder than doubt. "So your Sasaru offered a truce and the monsters okayed it?"

I risked a swift glance at Layna before replying, but her expression proclaimed no more than plain interest. "They accepted, Mr. Bowman, but with conditions. The sniffers hadn't dared implement their hibernation idea, not during a war. They were *aging* and craved repair desperately. But their survival imperative also made them wary of long sleep. The Sasaru or more primitive enemies might discover their unconscious bodies and find a way to injure or destroy them."

I raised my voice to forestall questions. "The idea of taking turns, setting watchers to guard the sleeping ones, isn't in the Givvern emotional repertoire. From a Sasaru or human standpoint, the sniffers are thoroughly selfish."

Weiss was nodding. "I can guess the

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truce terms. The Sasaru were to assume watchman duties, *nicht wahr?*"

I nodded back. "Indeed, Doctor. The lords were to become permanent caretakers, protecting the Givverns' sleeping bodies, waking them just enough for periodic feedings and the minimum of exercise—every fifty years or so—to maintain adequate health."

"Aerobic training!" Bowman chuckled in a surprising flash of his former humor. "A workout every fifty . . ." His voice abruptly trailed off.

"And the Sasaru added one final condition of their own: the Givvern had to agree to leave Ro forever. That's how they wound up here."

"What about offspring?" Weiss asked.

"Issue was no issue. I told you the Givvern were selfish and over the millennia they became more so. They'd eaten their own offspring for centuries. By the time truce was declared, the youngest females had dropped their final eggs. Their survival imperative doesn't extend to their species."

Bowman's expression had turned dour. Layna's eyes caught mine with an unmistakable question: What made him so angry again? I confessed ignorance by looking away.

Weiss raised an inquiring finger. "What was in this for the Sasaru?"

"Security, for one thing. The sniffers agreed to defend their old enemies if the need arose, and they also granted permission for their caretakers to use them as . . . bloodhounds in minor emergencies. Those-who-sniff have a highly developed sense of smell.

"Once the truce conditions were agreed on, the former adversaries entered into an extraordinary collaboration on a variation of the heartstones. They created a unique artifact—part radio, part recording and playback device, part . . . hypnotic periapt, tuned to sniffer brainwaves: the *Contequar*. This 'Trucestone' permitted the Sasaru to rouse their charges just enough to meet life's needs and then return them to full sleep."

Bowman was nodding, but his eyes were bitter and afraid. "So *you're* the guardian on call nowadays?"

"I am."

"And you say you're not one of the Sasaru?"

"On Earth, the lords have all died."

This was the information I'd been working to reveal. If the mountaineers believed me—and I wasn't being entirely honest—they wouldn't imagine some widespread alien conspiracy. No point in mentioning that, thanks to Vist, I had a number of Sasaru characteristics. . . .

On impulse, I addressed Bowman, "Is something bothering you, sir?"

His hands were clenched again and his eyes avoided mine. "What's Layna doing here?"

I could tell that wasn't his primary concern at the moment, but it left me on the spot.

Sometimes inspiration comes when most needed. "You aren't the only mountaineer I've rescued." The statement wasn't literally a lie; after all, I'd rescued Weiss. I hurried on before he could pin me down to specifics. "What's *really* troubling you?"

He finally met my gaze. "All right. Here's what I want to know: I gather you've been watching over your monsters for a long, long time. What the hell have you been feeding them?"

I could now divine the direction of his thoughts and it stung. As it happens so often, his error derived from ignorance compounded by arrogance. He wasn't humble enough to imagine how little he knew about my Castle. He'd had only my word that his wife and friends had been killed by Gurm. His new suspicion was clearly that I had murdered them myself. To feed my pets.

I tried to ignore the insult, but it kept burning. To my dismay, I cared what this man thought of me and badly needed to demonstrate my innocence.

"Come along," I said coldly, "and you'll learn where our food comes from.

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Umtash, remain here and ward my lady." For the moment, outrage drove all thoughts of danger from my mind.

The mountaineers followed in my wake as I turned left outside the Lookover. Their room was on this level, and they couldn't know how vast my home was. They had more than one surprise in store.

The long hallway apparently ended at a blank wall. Once at the wall, a hidden side passage was revealed. We passed the Gallery and that studio where Layna's looms had been gathering dust for decades. Then, even in my rage, I was gratified by the reactions from my visitors. They'd gotten their first look at the Starcase, the longest of the Castle's four grand staircases.

"What the . . ." Bowman gasped before joining his companion in silent disbelief.

The polished granite Starcase, sparkling with a billion flecks of mica, seemed to descend to the Earth's bowels. Mist at its base obscured the fact that the steps only went down sixty floors.

I had a far more efficient way to reach the Giver, but in my anger and pride I wanted the scale of my domain to put these fools in their place. So I made them struggle down twenty-five flights of stairs designed for someone at least my height. By the time we'd reached the proper level, both guests were dripping with sweat. Shame doused my rage and I finally slowed the pace, leading them through various corridors toward the main kitchen.

Nearly there, I realized that Weiss had lagged behind. He was standing before an arched doorway, staring into the room beyond. Hurriedly, I backtracked.

"What is that?" he asked, pointing.

My blood seemed to freeze. I hadn't considered that my route would take us past this particular room.

"It's a Sasaru art-form," I said quickly, placing my left arm casually across the entrance as if I needed something to lean on. "Part sculpture, part computer. Lord Vist created this one shortly before he died. Shall we proceed?"

The doctor was squinting and frowning. "I think I can—yes! I see pictures forming and changing. Is that a *Begräbnis?* What's the English?"

"Funeral. Lord Vist was representing the death ceremony of a great Sasaru king."

"But what are they doing to him?"

"Performing religious rites," I lied, firmly pulling Weiss along as I continued down the hallway. "Hurry now, we have but a relatively short distance to go." I hoped the unsophisticated eye could mistake surgeons for priests. Had Layna's transformation been so grotesque?

"How big is this damn cavern anyway?" Bowman asked after several more minutes.

"I do not lack for space. There are three other major staircases similar to the one we traversed partway and each one drops another fifty floors. Below the Laircase's final landing, the catacombs gradually descend another twenty Sasaru stories—about 240 feet."

"Jesus! Big enough," Bowman agreed nervously as we finally reached the kitchen entryway with its granite lintel twenty feet above us and its two polished chrysoprase pillars standing as sentinels to either side. "So why are we here?"

The question brought me to my senses. If Gurm chose to attack right now, I was too far from the heavily inhabited areas of the Castle. *And I'd left the Hammer in the Lookover!* Even so, now that the Giver was so near, how could I let Bowman's suspicion go unanswered?

Ignoring the American, I turned to Weiss. "Doctor, you once asked where I procured my strawberries. Showing you the procedure will explain how we feed our charges. Come inside here, and quickly. I have already wasted too much time."

The cookery was immense, designed

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to feed an army. My guests didn't notice the large but faint golden circle on one wall—their attention was captured by something less subtle.

"Holy shit!" exclaimed Bowman. "Is that screen some kind of built-in *TV* set? Crappy picture, whatever it is!"

We all stared at a commercial boisterous with artificial color and artificial enthusiasm in loud Hindi. My head chef followed a certain Indian soap opera and he must have left the Eye focused here.

I smiled without humor. "Consider it a Sasaru video monitor. It can certainly show TV programs or display other kinds of broadcast information, but its primary uses are analysis and . . . surveillance. With this device, we can observe scenes from all over the world."

"How does it work?" Weiss asked with the eagerness of a genuine technophile.

On a whim I refused to analyze, I decided to demonstrate my erudition. Pride can be as deadly as any blade. "Are you gentlemen familiar with string theory in physics?"

Weiss grunted noncommittally. Bowman shook his head but said, "I've read some of that old Brian Greene book."

"Let me be more specific. Do you know what Calabi-Yau spaces are?"

Weiss shook his head no; Bowman nodded uncertainly.

"According to Lord Vist's wisdom and what human physicists have been slowly deducing for decades, on the ultra-subatomic level, spacetime is built of almost infinitesimally small knots. Here, submicroscopic dimensions lie curled in fantastically ornate shapes—Calabi-Yau spaces, named on Earth after the two humans who postulated them. According to Sasaru scientists, nine different Calabi-Yau shapes form the framework of spacetime—three topologically equivalent trios—but they have one feature in common: holes."

"Holes?" Bowman repeated.

"The folded dimensions never abut perfectly. Each C-Y shape contains gaps, anomalies in reality. These holes are small beyond conception; the most refined Sasaru analog microscope—vastly superior to anything humans have developed—would need a hundred million times its resolution to model information on this scale. Still, minuscule as they are, the holes can be utilized because there are so bloody *many* of them."

My two guests exchanged glances and Weiss asked, "Utilized for what?"

"Energy can be moved through them like water through a sieve. Since the holes are a-spatial, the energy isn't inevitably bound to any specific location; and since the holes are a-temporal, the process is instantaneous."

"To mine ears," the Austrian said slowly, "it sounds as if you are speaking of the teleportation of energy. I have never heard of such a concept."

"Close enough, Doctor. With this machine, we can emplace distant force fields or snatch and then reassemble distant photons." Moving swiftly and feeling more irresponsible by the second, I moved to the control board. "Regard the picture, gentlemen."

The viewpoint moved backwards and the image shrank, revealing the edges of a battered old television set. Then, around the set, an unfamiliar room came into focus. We had a perfect window into a middle-class Indian home— complete with grandmother somehow sleeping through the TV hubbub. From the artifacts and the view through the house's own windows, we were somewhere in Bombay.

Bowman turned toward me. "What . . . what's going on?"

"Still find the picture inferior?"

"Hell no!"

I smiled thinly. "What we call the 'Eye' is capable of receiving satellite transmissions, but in this case, someone on my staff clearly found it expedient to simply focus the Eye at a TV already showing the program he wanted to watch."

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The American nodded thoughtfully. "I was wondering how you knew so much about the outside world."

"Actually, my chief source of information is the Internet. You might say that I have a true Ethernet connection."

"Incredible," muttered Weiss. "So this machine is for spying?"

"Not entirely. The Eye has a more important function."

I studied the Bombay room, spotting a two-foot-tall wooden statue of Lakshmi on an ornately inlaid, poorly constructed table. I centered the "pointer" on the goddess and adjusted the proper controls. Then I touched the golden circle on the wall and opened the Giver's mouth to retrieve the duplicate. I handed the statue's replica to Bowman.

"Jesus Christ! It's a damn Xerox! Can it copy *anything*?"

"The Eye analyzes patterns and the Giver assembles molecules to match those patterns. The process is inapt for living beings but it can duplicate *meat*. Understand?"

"But the statue feels like real wood and—"

"The statue is real wood created artificially. The process offers benefits; for example, we can enhance our strawberries to something wondrous."

"Cornucopia . . ." whispered Weiss.

"We get our food from the Giver, and much of our heat and energy. It enriches the Castle air and distributes—wait!"

My heartstone was warming. From the receiver implanted within my chest, seemingly in that hairline crack between intention and speech, came an ancient, peevish voice. It spoke in the language of monsters, mumbling, uttering only one totally coherent word: *Eat*.

My pride had caught up with me!

Expecting the worst, I hastily returned the guests to their room—this time employing a lift—and made certain their door was electronically locked. Cursing myself, I sprinted to the Lookover to retrieve the Hammer.

My self-castigation was appropriate, but my panic wasn't; Gurm hadn't yet commenced his assault. I ordered Umtash to post armed guards at the base of the spiral staircase that led to the Worldview, the Castle's highest room. Gurm's senile burbling had brought a peripheral insight: he intended to burn his way inside from a ledge about a thousand feet below the mountain's summit. From that ledge, the Worldview was only twenty feet down. And I would be waiting.

As I stepped onto the lowest tread of the steel ladder it rose smoothly.

Over a millennium ago, when Vist built the Castle, he'd designed this staircase as an ascending-spiral escalator in tribute to Aetum's Law. The Law states that life is cyclical, but each cycle finds us on a higher level. Therefore, the tread I rode soon brought me to the fixed steps just below the Worldview's entryway. These steps led up to the center of the vast room.

Here was the penultimate view: Sasaru image-windows all around, three hundred sixty degrees of unimpeded magnificence. Today, I was only interested in a direction I *couldn't* see: straight up.

The hours crawled. Umtash kept bringing me food that I refused to eat, drinks, and messages. Layna wished to join me—a request I denied. Those-who-sniff were twitching in their sleep. Bowman and Weiss had been discussing the marks on my lady's neck, and did I wish to hear their lamentable ideas? Not now, I could afford no distractions. . . .

I was knotted in doubts about my decision to leave the Trucestone in the dens. When Gurm burned through, I wouldn't have it on hand to forcibly remind him of the Contract. But I suspected that the monster would be unmoved by the ancient agreement and worried that my Denmasters might soon need the Trucestone themselves.

No, I required no further distractions.

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"Most sensible to ignore the ramblings of your guests, my lord," Umtash stated insincerely. "After all, the opinions of such men have no more import than the fewmets of dead rodents."

He was telling me I was a fool for not hearing him out. . . .

In the golden afternoon, Layna, disregarding my orders, rose from the staircase, a goddess rising from Earth to heaven. She was dressed in a blue diaphanous sari with a silver border. In her shimmering hair—a splash of winter moonlight—she bore an immense yellow diamond. She had never appeared lovelier to me, or more precious.

"My lord," she said, "we should not be apart this day. The eyes of my heart see an approaching darkness and strange memories are stirring."

"Tell me of these memories."

"I cannot. They are indirect recollections, not of events but of . . . forgotten times when I remembered those events."

Uncanny and unfortunate development! It should have been impossible for any lost memories from *before* to resurface, but I couldn't spare attention to pursue this now.

Digging past my own aversion to having her leave, I unearthed the one argument sure to carry her to safety: I claimed that an extra person to protect increased my danger. She gazed at me as if I were departing on an already sinking ship, lifted my hand and brought it briefly to her lips, and left without another word.

And the twilight rolled into evening. And nothing happened all through the starless, sleepless night.

The morning light revealed a peculiar weather pattern, ideal for doomsday. A thick, even carpet of clouds hung barely below us and a solid ceiling of cloud loomed barely overhead. The Worldview windows seemed to gaze out into a mathematical universe: an infinitely wide, gray, nearly two-dimensional plane. By my side, Umtash regarded the same view, but with greater equanimity.

"Perhaps he changed his mind, lord, or you misunderstood his senile ravings. In either case, why should you remain here any longer? Why not take your ease and breakfast in the Lookover as usual?"

"Thank you, my friend. Perhaps I will. Soon. Permit my lady and our guests to commence their meal without me. Meanwhile, return all guards to their posts at the periphery."

"Your command pleases me, my lord."

It failed to please me.

Another hour passed. It seemed to last a year. My left temple developed periodic throbbings severe enough that I was forced to close my eyes until each episode had passed.

Bowman was in a foul mood as I finally entered the Lookover. Preoccupied with complaints, he didn't notice me as I approached the table. "I won't be shaved by apes, Layna! Why aren't there any damn mirrors in your castle?"

"The Sasaru considered them bad luck, sir," I answered before my lady could admit that she didn't know. "I'm afraid their beliefs have stained mine."

The man turned and stared at me for a moment. "Well, I have to admit you're thorough about it! Even your *silverware* has a matte finish. And speaking of silverware, I've been meaning to ask: what's this corkscrew decoration on my knife? I've keep finding the same damn shape in the damnedest places around here."

"The Ascending Spiral signifies that life is circular, but—"

The American wasn't truly interested. "Yeah? I thought it might mean 'Screw You.' Look. Just give me a razor and a mirror. Superstitions won't cut it—literally. This fuzz on my neck keeps itching like a bitch! Besides, I need to see how my nose healed up."

"I'm sorry, Mr. Bowman, but I will not allow reflections here. I've offered to have one of my servants shave you. Or

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Doctor Weiss might do the honors?"

"Right. Maybe I'm a tad superstitious myself. Heinz has this tremor in his fingers and your gorillas have hands like catcher's mitts—can't see them doing delicate work, not near *my* throat."

"That, sir, is your limitation."

I spoke sternly, but the absurd notion that my ultra-meticulous Yetis couldn't be trusted with a mere razor, rose up in me, a bubble of irrepressible laughter. It burst forth and two gasps told me that I'd finally opened my mouth enough for my guests to see too much.

The thunderstorm began in the late afternoon. I watched it for a time from the Worldview between bouts of headthrobbing. Most bolts were actinic flashes in the clouds below, but occasional forks of painfully blue lightning would rocket between the lower cloud layer and the upper. Electric fury between sky and sky. It never occurred to me that mere electricity could pose a danger to the Castle.

The storm continued into the night. At midnight I was in the Library, staring into a bowl of cooling soup, begging myself to stay awake, when the lights went out. Every hair on my body stood erect. The air was abruptly perilous with fist-sized, brightly luminous spheres—sun-hot ball lightning. Emerald sparks spat off metallic surfaces.

The two people I loved best were with me, coaxing me to eat. "What is happening, Marq?" Layna cried out.

"I don't know! Umtash?"

"You might wish to lower your head, my lord."

Feeling heat on the back of my ears, I ducked, and one of the fiery objects floated by. These things were slow enough to avoid, but I was concerned for my books and scrolls, particularly the only existing copies of those works that Vist had rescued from the Great Library at Alexandria. To my relief, the eerie globes began dimming.

My majordomo offered a theory as bizarre as the atmosphere.

"It is barely possible, lord and lady, that we may be the victims of a remarkable occurrence. As you know, my lord, and probably know, my lady, one facet of the Eye is currently focused on a few square yards of air above the lowland foothills. The Giver is duplicating this air and filling the Castle with its richness.

"So I've been told," said Layna.

"My undoubtedly fatuous idea is that an electric bolt traversed that focal point and the Giver duplicated the charged particles and distributed them the way it distributes air."

"Aetum!" I swore. "An incredible notion, Umtash, but logical."

"Thank you, lord. If the concept is true, we may have fires to quench." He thought for a moment. "The effects should have been most severe in the two rooms we constantly cool with forced air: your workshops and the—"

"Kitchen! That's why the lights went out! All that random energy has damaged the Giver. A self-limiting disaster, fortunately for us. Umtash, *you* are the blazing wonder here!" His theory accounted for every fact.

"Thank you again, lord. Do not fear, my lady, my staff will already be fetching candles and those kerosene lanterns we use when the Giver is shut down for servicing. If it is damaged or needs resetting, it will soon be restored."

The local charge had nearly dissipated and it was strangely soothing to sit in the dark with my favorite books and favorite people.

"Your new sculpture!" Layna exclaimed suddenly.

"Moved to the Upper Gallery days ago. But thank you for being so . . . ai!"

"What's wrong, dearest?"

At first I'd thought some lurking fireball had found me. "Gurm comes, blasting his way toward the Worldview. He is screaming into my chest through my heartstone. It burns, my lady. My command to both of you: stay here!"

* * *

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I'd been given eyes and ears nearly as sensitive as those of cats, but even cats require some light to see. All Sasaru windows had shut down, so without even the infrequent bursts of lightning, the Castle was dark as a buried cave. I hurried along hallways using memory and my nose and ears as guides.

A distant glow resolved into Dhorga, Umtash's daughter, who was holding a mantled kerosene lantern in one hand and a salt shaker in the other. Which seemed surreal until I remembered how salt burns off soot. The light allowed me to sprint, but the Yeti waved the shaker like a warning flag when she saw I wasn't about to stop.

"Lord! I need but a moment. The guests—"

"No time, good Dhorga. Gurm attacks!"

She let me pass, but yelled her message at my back, "They escaped when the power failed. Our locks depend on. . . ."

"Find those fools!" I shouted over my shoulder while running into thickening darkness. The visitors' gear, which I'd returned, had included battery-powered headlamps. I prayed the men could be located before they encountered anything lethal.

An oily scent saved me from crashing into the spiral staircase. I stepped onto the first tread, but naturally, with the power gone, nothing happened. Grinding my teeth at my own stupidity, I scrambled up and entered the Worldview just as a round patch of its ceiling was turning bright crimson.

With a crackling roar, the patch became a hole; a torrent of what looked like molten lava poured down. Behind it, immune to such volcanic spew, came the monster. The air filled with a reek of sulfur, hot stone, and alien vomit. I withdrew the cylinder from my pocket, let it assemble itself into the Smooth Shield, and worked the strap over my right shoulder. With my left arm, I raised the massive handle of the Repeating Hammer and waited.

Part of the granite floor was covered in acid-flames now, but Umtash and I had calculated it would hold. Burning through twenty solid feet of mountain would have required nearly all of the monster's acid, and the melting rock would have largely neutralized it. As an extra precaution, we'd doused the floor with Givvern antivenin. This fire shouldn't last. . . .

While flames yet illuminated the room, I studied my enemy while he studied me.

Gurm was something out of a nightmare too intense for mere sleep.

A good thirty feet in length, he could indeed have been the dragon prototype, except that he lacked wings and his massive legs were improbably long. Markus Bowman could have strolled upright under the serpentine body without bruising his head on the glossy belly scales.

The few visible patches of Gurm's skin glittered like feldspar, but a forest of quartz-like crystals in various sizes, shapes, and colors obscured his hide. These were formed biologically rather than geologically, and each was separate, permitting them to slide past each other so that Gurm could move freely. The crystals were hard enough to scratch glass. Two especially long, translucent specimens were twin horns springing from his forehead.

The mouth was threatening as a crocodile's but came to a sharper point; the hooked teeth were clear, hard silica. The huge platinum eyes glittered within massive knobs protruding far to each side of his head. A hammerhead shark with a giant gar's jaw . . .

I searched those terrible eyes for a glimmer of recognition or understanding but found nothing except appetite.

"Gurm," I said aloud and through the heartstone. "Do you not know me? Lord Marquindrol, the final guardian? We have a compact. You must trust me!"

The fear I heard in my own voice made me doubt that I could trust myself.

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The monster was still for a moment. Then, with a hideous belch, it attempted to disgorge more acid. Only a few stinking, slimy bubbles emerged from its mouth, burst into flames, and dripped downwards in pyric drool. I took two hasty steps backwards.

Perhaps he did remember me, dimly. Otherwise, he would have tried to consume me, not burn me alive.

"You do us both a disservice, oathbreaker," I said. "Perhaps you recall . . . this?"

I squeezed the Hammer's handle and the head appeared, a shaped force field glowing a deep cobalt blue, energy wrapped in energy; it would be brightening soon. The popping and snapping of sparks on the head's pseudo-material surface made an ugly duet with the floor crackling where bile fire still raged.

Although its wielder is heavily protected from the ancient weapon's radiance, I felt the furnace-heat on my throwing arm and the left side of my face.

Now it was the beast's turn to retreat. With my free hand, I clenched the heartstone, desperately striving to resolve this crisis without breaking my own vows. Or dying.

"Behold the great sledge, Gurm, scourge of your kind. Queen Gloudin herself forged it in the Dark Days, have you forgotten? Aye, this weapon was her proudest achievement. Do you remember its Sasaru name? *Myoll'nir*: the Hammer that throws itself time and again! Are you surprised to find it here? The Queen's grandson Ti'r brought it to Earth and Ti'r, on his deathbed, instructed his Norse servants to bring it to my Lord Vist. Now, it rests in my hand. With this machine, I can hurl a killing power that only increases through use. Surrender, and I will not apply it."

The monster finally seemed to be listening to me. So long as he wasn't attacking, I intended to keep talking, saying anything, hoping to—.

No. He wasn't listening. I heard the faint rattling of metal-hard scales—Givvern laughter.

Horribly, I knew what Gurm had found so amusing: by now the Hammer should have flared into fearful incandescence. Instead, the room remained lit like an amateur stage—blue light on one side, red flame on the other.

True, the Hammer hadn't been used for millennia; yet who would have thought Sasaru technology could ever fail? After all, the Giver kept on giving. Ah, but the Giver had been repaired a hundred times. . . .

Perhaps technology wasn't the problem. The sledge had been tuned to my nervous system two centuries ago. Perhaps *I* had changed.

One instant, Gurm was as fixed as the past—the next, he was leaping towards me. I desperately pulled the Shield off my shoulder and expanded it while swinging it into line.

Barely in time. The collision sent me skidding, sprawled on my back. I would have died right then, but the Shield's ultimately polished surface sent the monster skittering off to one side. He snapped at me in passing but missed, then lashed out with a quartz-spiked tail at the last moment. I managed to roll aside, but one of my arms was sliced shallowly from shoulder to elbow. As the blood welled, I blessed Vist for my improved reflexes. Gurm stopped himself and spun around for another charge. I sprang to my feet, shrank the Shield enough for better visibility, and commanded the Hammer to strike.

The force field was a streak of blue light as it flashed across the room and smote the monster's forehead. By the time I heard the shriek of tortured air and the crack of impact, another charge was already forming on the handle. The bite of ozone joined the other stenches in the air. . . .

I stared at my enemy. At a fraction of its proper energy, the Hammer had done insufficient damage. The Givvern shook his massive head, which rattled

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because the blow had loosened one forehead spike, and he began moving toward me, cautiously this time. I glanced down and felt a fresh thrill of fear. My weapon wasn't recharging properly! The head was a dull indigo and its coating of sparks was threadbare.

Were any guards rushing to my succor? Unlikely they could get here in time. If I died here, how many people would Gurm kill before he was stopped? *Could* he be stopped? Layna was in danger! I had to somehow lead the monster away from the Castle's populated areas. And by Aetum's holy Name, I needed a functioning weapon. . . .

The Worldview's hundred lights flared back on, but with an uncertain flickering. Reflected in the Shield's concave backside, in my peripheral vision, they suggested twinkling stars. Gurm stopped, looking around wildly as if some new attack was imminent. With a crazy inspiration, I whirled around and dashed toward the entrance. As I'd hoped, my enemy followed; but with those long legs, he was faster than any mock Sasaru. He almost had me as I reached the entrance stairs; the great jaws ripped the cloak off my back.

Then I gained some time. The spiral ladder was narrow and the monster wasn't. While he squeezed his way along, I slid down the steel helix of the handrail, determined to await him if necessary. I wanted him to keep following me and not become distracted by other possible meals.

When I reached bottom, waiting proved unnecessary. Partway down the staircase, the Givvern smashed through a section of railing and jumped over the side. He was galloping the instant his feet hit the floor. How could I stay ahead of this animate whirlwind?

As I passed the Lookover, I pivoted and forced the Hammer to strike again. Gurm skidded to a brief halt and I resumed my flight. The frail force field couldn't have caused any injury, but I wasn't trying to buy victory here, just time enough to reach the Starcase.

And I did. Perhaps my pursuer was enjoying the chase, toying with me, never expecting me to move faster than my best running speed.

At the top of the grand staircase, I inverted the Shield, expanded its gently curved surface, and jumped inside—making sure my right-hand grip on the strap was secure. In this alien toboggan, I slid down the steps, accelerating quickly as a fall. Lying back, with my head tilted backwards, I watched an upside-down Givvern galloping down reversed steps . . . getting farther and farther behind.

So far, excellent. But now I had a problem: how in Aetum's name was I going to *stop*? A right-hand turn from the rapidly nearing base of the Starcase would lead me to the Armory, my destination; but since I had no way to make that turn, the Shield would soon be sliding along a short corridor ending in a stone wall. How fast was I going now? A hundred miles an hour? Faster? The stairs were but a blur. I wouldn't survive such a crash.

The Sasaru claimed that desperation is the mother of improvisation. . . .

My life depended on how well the Hammer would respond. Its bound energy was still alarmingly pale and weak, which meant I had to work delicately despite the overwhelming need for haste. As gradually as I dared, I adjusted the force field, making the head thinner, but much wider. I glanced ahead; only three flights remained!

With one hand clenched around the Shield's strap and the other grasping the Hammer's handle, I expanded the head until it pressed tightly against the marble banisters bordering the Starcase. White sparks sprayed hugely on both sides and my stair coracle slowed rapidly.

Until I ran out of banister.

I hit the wall feet first, so hard I was thrown upright. I never saw the granite coming.

* * *

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After seconds or hours I awoke in utter panic. The lights were still flickering. I wiped blood from my eyes, staggered to my feet, and looked around desperately only to receive a sour lesson. One thing is more terrifying than a monster in pursuit: a monster who could be hiding anywhere.

I didn't dare take time to reach the Armory and, with the Giver misbehaving, I couldn't risk taking a lift. So I began lurching up the stairs, yelling for help, and the sixty stories up seemed as sixty miles. My swollen forehead throbbed worse with every step.

"Layna!" I cried in a voice even weaker than my Hammer.

Denmaster Thar caught up with me when I was halfway up. He understood my haste. Without asking, he flung me over his good shoulder and began running up the stairs three at a time. Yetis have powerful legs and feet that can adapt to any surface. I looked both ways down every corridor we passed, but saw no Givvern.

When we reached the top, I sent Thar to the Library to check on Layna and Umtash. I very much wanted to do that myself, but since Gurm could reappear anywhere, I needed to keep myself more centrally located. I waited in Vist's old meditation room and listened to reports. Among my staff, no one had seen the enemy. He wasn't in the Lookover, the Gallery, the laundry, the kitchen, or anywhere I might have expected. Which still left a thousand possibilities. It didn't cheer me when the lights finally steadied.

Then it dawned on me that Thar should have reported back some time ago.

Moving as rapidly as my bruises permitted, I hobbled to the nearest lift and descended several floors to the Library. The doors lay shattered. The scene that appalled my eyes when I stepped inside burned an instant, permanent image into my soul.

My Denmaster was bitten nearly in two. The left side of Umtash's chest was a gory ruin . . . and Layna, crumpled near a wall, was missing most of her right leg. All three victims were on the floor, dead or dying. I had failed them all.

My lady's severed leg lay between Gurm's front legs and the beast was staring down at it, eyes filled with both greed and confusion. The leg was mangled. Perhaps the monster had chewed on it then spat it out.

The monster had taken hurt, but not enough; his loose horn had broken off and was lying at my feet. Thar's dead hand was wrapped around a Blunt Sword's hilt and the blade was bent and almost dark, its energy-derived edge barely flickering. Gurm had become hideously tough over the centuries.

As if from a distance, I heard a lonely keening. I felt the vibration before I realized the sound was coming from my own throat. . . .

An incandescent wrath like none I'd ever known made my body tremble and my mind boil. I had a weapon in my hand, and feeble as it was, I swore to make it serve.

I tossed the Shield aside so it wouldn't interfere with my movements and scooped up the broken-off horn. The massive Hammer felt weightless in my hand as I adjusted the head, wrapping the force field's dregs tightly around the quartz spear.

Gurm finally looked up. For an instant, it glared at its own lost horn, now pointed directly toward its face. Then the monster stood, bellowed, and charged. With all my strength, I swung the Hammer and pressed the release switch.

The crystal-embedded head wobbled through the air, far slower than I'd hoped. But it struck true: exactly in that tender, empty spot where the sharp crystal had grown. The stone spike drove deep into the monster's brain.

Black fluid gushed as if the spike had struck oil, and Gurm screamed horribly, trembled, and slowly collapsed. Flat on

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the floor, spasmodic twitches moved his corpse unsteadily across the room in a grotesque parody of a baby's first crawl. Then it was still.

My heart ran to Layna, but I didn't let my body follow. If she was alive, she alone had a fair chance of surviving the next few minutes without my aid.

First, I checked on Thar, pulling the sword from his flaccid grip. For him, I could do nothing, not even grieve yet. Umtash was still breathing . . . barely. I set to work.

It took ten minutes and a minute short of forever to do a crude repair; refinements would have to wait. I concentrated on my majordomo's half-missing lung. My healing cells poured out so thickly that I quickly became nauseated and terribly dizzy. I didn't dare pause, even for a moment, until the cells had assembled themselves into a fragile but usable rib cage along with enough temporary muscle to operate it. Gritting my teeth against the encroaching blackness, I commanded my microscopic army to cover the wound with new tissue; the result was a patchwork too thin to be considered skin.

I had to rest, but I couldn't.

Layna *was* alive! My tears of relief infuriated me—I needed to *see*. She, of course, wasn't bleeding but her injury was life-threatening nevertheless. The stump of her wound was slimy and little beads of fluid coated her face. My heart jackhammering, I staggered across the room to retrieve her severed leg. It also felt slimy. Gurm's drool, or was the pseudo-flesh breaking down? Could I still reattach it? And why, I wondered dully, was the thing so cold and heavy? Perhaps I fell down several times while carrying it back; I can't quite recall. . . .

I shook my head. The room seemed to steady and I saw that somehow the leg was in its proper position. I wiped Yeti blood from my lips, and my own from my eyes, and tried to summon up hidden juices from the arid well of my spirit. Even if it killed me, I was going to heal my lady.

I put my mouth against her neck, squeezed fluid from artificial glands that should have been utterly empty, and visualized pouring love and health into her injured body. Slowly, the leg began to meld with her torso.

In a far corner of my mind, a thought was festering that I'd forgotten something important.

I heard fast footsteps coming from behind me. I tried to turn, but something hard and heavy smashed into one side of my head. Lord Vist had toughened my skull, but the blow left me too stunned to resist the arms that grabbed and hoisted me to my feet, pushing me against a wall. Vaguely, I felt rope binding my wrists behind my back.

"Jesus God!" I recognized Bowman's voice, but my vision was a blur. "The bastard's even heavier than he looks! Check the girl!" Then with barely a pause, "Well?"

"She is merely unconscious," Weiss responded. "*Gott sei Dank*!"

My eyes just wouldn't focus. I tried to break the rope but my muscles only twitched. Grunting with effort, Bowman turned me until my left shoulder smashed into a wall. Suddenly I felt and smelled an apple-vinegar breath in my face: Weiss's characteristic odor. I knew the doctor had to be standing directly before me. I blinked hard, twice, and sight gradually returned.

To my shock, Weiss was grasping a sharpened wooden stake in one unsteady hand. He wouldn't meet my eyes. Where in my Castle, I wondered, had this man procured a piece of *rosewood*?

Then I remembered. I'd made the Giver copy a wooden statue and had placed the thing into Bowman's care myself. The men probably used knives from their climbing gear to carve it into its present shape—but why? For a weapon? It had made a fair club, as my head could attest, but seemed a clumsy spear. . . .

The American was at my side, grasping my right arm with both hands, using

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the wall on my left to support much of my weight. I craned my neck to check on Layna; her leg was hers again but her erratic breathing frightened me.

"What in Aetum's Name,"—my voice was appallingly fragile—"do you two think you're doing?"

Bowman tightened his grip. "What we must. God knows, I'm *real* sorry if I'm wrong. But, hell, there's too much evidence. Caught you red-handed—red-mouthed, I should say. Heinz didn't believe me at first, called my hunch 'a paranoid speculation on an American obsession.' Still think I'm nuts, doc?"

"I would much prefer that you were. Such creatures should not exist."

Weiss's eyes were still averted. What were they *talking* about?

"Release me. I lack time for your insanity."

"We can't," Bowman stated, almost apologetically. "Look, it's simple enough. This place is filled with myths come to life. Yetis, dragons . . . the damn Horn of Plenty."

So? Couldn't this fool guess that the Sasaru had provided fertile ground for human legends? "Why should such myths—"

"So why not vampires? Right?"

"*Vampires*?" I wasn't amused.

"Well . . . just you. We noticed how Layna keeps getting paler and paler. We saw those marks on her neck. And I'll never forget the day your face was all bloody and you admitted you weren't hurt. This morning we saw your god-damn *fangs*. Here's another little clue: you hate mirrors. And right now your mouth is dripping with blood. Lord Weirdo, it's a fucking slaughterhouse in here. I assume these two servants caught you draining poor Layna over there. So you attacked them, and Jesus, you meant business. Looks like you bent your sword hacking that big ape apart."

They hadn't seen me healing Umtash or Layna. . . .

"You think all this is *my* doing?" I burned with frustration and humiliation. I'm no Sasaru, but normally I could have snapped the cord around my wrist in seconds.

"What else can we think?"

"And your response is to kill me?"

"We don't want to; we haven't forgotten that you rescued us. But I think we *have* to. The lady won't last much longer otherwise. Besides, the stories all agree that vampires are like—like viruses, spreading if they're not wiped out. According to the same stories, it's also what *you* want . . . deep down."

I tried to collect my scattered thoughts. "Mr. Bowman, might you be hoping that if you puncture my heart, my lady's will become open to you?"

His face darkened. "Hell, no! That's a load of—"

"You've pulled everything inside-out. I was laboring to save these lives, not end them."

"Yeah, right. Try again. We saw you sucking—"

"No, sir!" Fear for Layna buttressed my voice. "You leaped to the wrong conclusions. Look across the room. That dead creature across the way is Gurm, the Givvern who consumed your wife and friends."

"Creature? All I see is a big pile of rocks!"

"Please, go examine it more closely."

"How stupid do you think I am? I'm staying right here."

I took a deep breath. "Listen to me: I am no vampire. When Lord Vist modified my body, he—"

"Shut up! Just shut up!" His voice, loud and edged in hysteria, drowned mine out. "Heinz, ignore this bastard—he's just trying to confuse us. Time to end this before he talks us into forgetting what we know."

"But Mark, my friend, *mein Busenfreund*, what if he speaks truth?"

"Damn it, you just saw him in action! You *know* we can't risk letting him go. Look at Layna! How much more blood can she afford to lose? You're the doctor, you tell me. If you don't have the balls

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for this, hand over the goddamn stake."

The habitual tremors in Weiss's hands were full-blown quakes. "Very well, but I hate this," he complained, slowly raising the piece of wood. "I took an oath to *protect* lives, Mark. If we—"

A slender pale hand grabbed Weiss by the belt and, effortlessly, threw him backwards through the air. The wooden spike skittered far across the floor. By the time the doctor landed on his back, hard enough to knock his vinegar breath from him with an audible *whoosh*, Bowman was engaged in his own solo flight.

My smile felt like a twisted thing as I tried to catch Layna's eyes. One of her hands was still gripping a wall carving; she'd needed the leverage.

"My lady," I panted. "I thank you."

She didn't seem to hear me. Her attention was focused on something several yards away. I followed the direction of her gaze and felt as if Bowman's stake had struck my heart after all.

We were now both staring at a perfectly round convex disk on the floor showing a clear, if distorted, reflection of the room. The Smooth Shield. Discarded with carelessness that will torment me forever.

I lurched forward, but my legs betrayed me and I fell on my face.

Layna didn't notice that either. As if entranced, she moved forward and stared down at her own reflection. Only one hope remained: the mirror's curvature was enough to deform my lady's image to harmlessness.

She made a sound somewhere between a gasp and a sigh, and all hope died.

Bowman sat up; Weiss had all he could do just to lie there and wheeze. For a long strange moment, his labored breathing was the only sound in the room.

Slowly Layna straightened. She seemed taller, her bearing transformed into one of total self-possession and command. Ah, but the look in her eyes was far from the one I'd been dreading for two hundred years. In lieu of loathing and fury, her gaze was rich in love and pity. I didn't understand. . . .

"I'm sorry, my queen." Centuries of guilt forced the words from my throat roughly. With my hands tied behind me, I had to roll over onto my side before I could hunch up to my knees. My head was still woozy and I overbalanced. Before I could topple again, Layna leaped back, caught me, and pulled apart the ropes as if they were fragile threads. With an arm around my waist, she hoisted me up until I was standing.

"What," Bowman demanded, "the hell is going on here?" His astonished eyes were aimed at Layna. "What *are* you, lady?"

Layna looked at me for a moment, but I couldn't imagine anything adequate to say.

"A relic I am," she stated dispassionately, "of a lost age. Perhaps the final such relic." She glanced at me again and I nodded unhappily.

"My lady," I said quietly, "is the last of her kind on Earth. For all I know, the last living Sasaru anywhere."

"Living?" Her eyebrows lifted in gentle inquiry and I felt myself flush.

Weiss finally managed to sit up and he and Bowman stared at Layna in twinned bewilderment.

Bowman pointed at her. "*You're* an alien?"

"Not from my viewpoint," she said with a genuine smile. "We have much misunderstanding here, and dearest Marq, I'm afraid some is yours. You've been horribly used."

"Used? Me?" I sputtered for a moment, choking on the irony. "I'm the one who's kept you trapped for so long. I'm the one who selfishly kept you half asleep. I'm the one who couldn't stand for you to die, couldn't stand to be left alone. I'm the—"

"No, Marq. You were forced to act as you did."

Her words made no sense. "How? By whom?"

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"Hold on two damn seconds," Bowman grated. "Would one of you . . . *Addams Family* rejects mind clueing us in? I'm not following a bit of this." Weiss watched silently, rubbing his neck.

Layna caught my hand and held it tenderly. "May I do the explaining, dearest Marq?"

"Please."

"Gentlemen," she began, addressing the guests. "Lord Marquindrol told you of Ro biology, how many Ro animals and plants have both carbonaceous and siliceous characteristics. You must understand that the Sasaru nervous system evolved to take advantage of the combination."

Weiss opened his mouth but didn't speak.

She nodded. "Yes, Doctor, the Sasaru brain is partly a living coprocessor. By studying ourselves, we learned to make artificial computers even before we developed the internal combustion engine. On Ro,"—her eyes sparkled—"efficient semiconductive material grows on trees."

Weiss's lips were working, but still no words emerged.

"Also," Layna continued, "by observing our native life forms that were largely or entirely silicon-based, we learned how to adapt siliceous cells to our purposes. We learned how to construct durable bodies whose structure was largely based on such cells; and we found means to transfer information stored in our . . . internal network to these bodies."

"What, exactly, are you trying to tell us?" Bowman demanded.

"My present body is just such a construction."

For a full minute he just stared at her. "But—but," he finally stammered, "you look so . . . human."

"Deliberately so, my young friend. Here, among so many millions of your kind, my lord Vist cast my new shape in an idealized human form. A precaution, should humans ever discover me. Originally, I resembled my beloved Marq in *his* present incarnation."

Weiss cleared his throat. "Why did you need a new body, Layna?"

Layna's smile held no hint of regret. "The old one had worn out, Doctor. Our medical science allows our natural bodies to live tenfold their natural lifespan, which itself is longer than your human cycle. Yet all bodies have their limits. This is a blessing, for we are not made for immortality. After a thousand Earth years, or two thousand, or three, life becomes flat and dry, a vast dead weight, daily more unbearable."

"You," Weiss almost whispered, "are a thousand years old?"

"Older, child of Earth. Much older. Old enough to know that when life's luster has finally dulled, death alone is desirable. Most Sasaru who reach this stage have been allowed that grace."

"Why not you?" Weiss asked.

Layna passed the question to me with a look. "In special cases," I said with a false calmness, "the Sasaru preserved those elders deemed too important to lose, transferring the elders' memories into the artificial bodies my lady described. The process doesn't restore zest for life, but personalities thus embodied are far more . . . controllable."

"Programmable," she added with a strange emphasis. She was trying to tell me something.

Umtash snorted gently in his sleep, which seemed as startling and loud as sudden thunder.

Weiss reached for the essence. "What made you so important, Layna?"

Again, she left response up to me. "Doctor Weiss and Mr. Bowman," I said slowly, "allow me to reintroduce you to my companion. She who stands beside me is Layna, High Queen of the Sasaru."

To my astonishment, my lady twirled once, laughing. Had I been wrong all these years about the consequences of allowing her to reawaken? Had all the heartbreak I'd caused her been for *nothing*?

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"Until a few minutes ago," she said lightly, "I'd forgotten that I'd ever worn the royal amulet. Then I looked into that mirror and everything came back."

Weiss's forehead crinkled. "Why should . . . how did . . ." He couldn't seem to frame the question.

Nevertheless, my lady answered. "Sasaru who have been 'crystallized' suffer the ills of human information systems, Doctor. Data becomes distorted or lost and, eventually, the . . . platform operates slowly or becomes erratic. This condition requires—what's the word, my lord?—refreshment?"

"'Rebooting' comes closer."

"Thank you, dearest. Lord Vist provided a simple way for me to reboot. He made the process dependent upon my seeing—"

"The most beautiful thing in this world," I interrupted.

"No, my lord. Your love for me has distorted the truth. All I needed to see was the specific design integrity of my new face. Unconsciously, I have been seeking this awakening endlessly."

"So our host bans mirrors," Bowman said harshly. "But why?"

"My lord has been trying to preserve my life, such as it is, and it has cost him dearly. I was sick of life before my crystallization, and even Vist in his wisdom could not provide more than a temporary respite from weariness. If Marq had permitted me to reawaken, I would have applied an option inherent in this form and shut myself off forever."

I couldn't contain the question any longer. "Why, then, did you say that it wasn't my choice?"

Layna looked at me with eyes that were bright, compassionate, but determined. "When Vist transformed you, my dearest, he gave more Sasaru attributes than you know. He added a Sasaru-like siliceous circuit to your brain and programmed it cruelly."

My throat had gone dust-dry and I couldn't speak or swallow.

My lady understood. "He *made* you love me and want to protect me. You never had a choice. I'm deeply sorry. In a sense, we've been prisoners of each other."

I forced my vocal cords to work. "No, my queen. Perhaps my love was an artifact at its inception; I have to accept your word. Yet have I not been nurturing it for two hundred years? I do love you and if any feeling is genuine, this one is."

She pulled my head close and brushed my cheek with her lips. "We become what we practice, my dearest. I have come to love you also, even in my dimness. But our feelings can only be as real as we are."

I wasn't certain if the statement was affirmation or denial but I felt her soft kiss long after she pulled away.

"So, Lord Marq," Bowman asked softly, "what were you doing to Layna when we came in?"

Before I could speak, Weiss placed a question of his own: "Why does she keep getting paler?"

My lady chose to answer. "Mr. Bowman." Using his family name conveyed a hint of asperity. "Even Sasaru technology is imperfect. As this body ages, it requires maintenance; cells break down, wastes build, and microorganisms find nutrients in its remaining carbonaceous aspects. Vist supplied my lord with a means to keep the two of us healthy. The mechanism involves cells specialized for repair. My body lacks proper blood sugars for such cells to thrive, so my lord has been my doctor. Simply put, his bite heals."

"I thought he was a vampire," the American muttered.

"If anything, I am the vampire here," she said softly. "My body would have perished long ago without his infusions. And Doctor Weiss, my pallor is also a result of Sasaru limitations. The siliceous aspects of my form require some external power. The Giver, the device that supplies such energy, derives it from the sun and with the shorter and colder

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days of winter," she finished simply, "my cells lack strength for full coloration."

For a long moment, no one spoke. One question I needed answered above all, but I was terrified to ask it.

At last, I couldn't bear not knowing. "My lady . . . my queen. You seem restored. I have never—"

She stopped my words with a finger laid across my lips. "No, my love. I see the fresh hope in your beautiful eyes, and I cannot express how deeply I regret disappointing you. You deserve better. Still, the joy that you behold in me now resides in the nearness of my release."

I tried to keep my feelings contained, but she could easily read my heart.

"This day," she murmured gently, "was unavoidable. You must have known that."

I knew.

She turned to face the guests. "Mr. Bowman, Doctor Weiss, will you pursue your unfair attempt to harm your host?"

Both men shook their heads and Bowman had enough grace to blush.

She turned back to me. "Dear Marq. Even the largest pool becomes filled eventually and I was filled a thousand years before you were born. Peace, my love. The heart is a tyrant. I know this, for you are priceless to me and I would do anything to see you safe and almost anything to see you happy. But know this: I carry far too many centuries. I am weary beyond redemption.

"For long and long, and unknowing, I've craved nothing but escape from this frozen shell. I tried to find it in the world, and then in craft, then in dance. Finally, I knew enough to seek it in the beauty of your art. Now here, in this clean circle on the floor, I've found everything I need. Still, even now, I will not depart without your blessing. So I beg you, beloved: *let me go.*"

This was the moment I'd been dreading for longer than I could remember. Now that it was upon me, I felt agonizingly alone—as if my life had always been a thin, friable membrane. And underneath, reality was a crushing, dark universe of loneliness.

Yet the desire and anguish in her pale, radiant eyes was greater than loneliness, greater than my needs. I couldn't speak and couldn't smile and yet she understood.

She gazed back into the mirror one last time, stood straight and closed her eyes, then raised her arms above her head like a goddess dancing. "Farewell. Aetum bless you all."

From one heartbeat to the next, she released herself. I hadn't had time enough to cry out her name one final time.

Suddenly, the room was blazing with actinic blue light. The connection between the Repeating Hammer and my mind, constricted by decades of guilt, was reestablished. Without any conscious intent, I picked it up and sent its head across the room to crush the stake to tiny splinters against the granite floor.

In the following days, Umtash recovered nicely. We buried Thar in the ancient Nepalese manner; the old music was so true to his spirit that the Castle itself, echoing the sounds, seemed to mourn him.

The mountaineers and I concocted a story involving an avalanche and a lucky escape to explain the fate of their expedition and their own survival. With poorly mixed feelings, I provided the men fresh supplies and released them out the Low Portal.

As for me, I've come to doubt Aetum's Law. How could the Ascending Spiral ever carry me upwards again? I can do nothing but ride the moment, attempting the ancient Nepalese art of dealing with pain through total acceptance. Perhaps, if I devote my life to this, I will someday be able to sit in the Lookover, as I am sitting now, and take my solitary breakfast without these tears running down my cheeks. ■

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SCIENCE FACT

WE ARE LEGEND:

THE SOCIAL CONSEQUENCES OF THE AIDS CRISIS

Laura M. Kelley

The annals of science fiction abound with stories of plagues that threaten to destroy humanity or life on other worlds. As microbes claim more victims, survivors race against time to find a cure as in *The Andromeda Strain*, or to rebuild civilization as in *The Stand*. One work, however, stands apart in its graphic depiction of the societal consequences of mass epidemics. In 1954, Richard Matheson wrote *I am Legend*, and in it described the plight of Robert Neville, the lone man immune to a great plague. In the book, Neville battles against bloodthirsty creatures of the night who are just unfortunate survivors of the pestilence. As the novel progresses, the strength of the vampires grows as Neville fights every day and night to prevent a complete takeover.

Today, we are in the throes of a similar battle against Acquired Immune Deficiency Syndrome (AIDS). The victims of the plague are not horrible monsters, but are our parents, brothers, sisters, sons, and daughters, whose collective deaths threaten to dangerously destabilize the future of our world. A recent report by the National Intelligence Council (ref 1), predicts that by 2020, over 130 million people will have died from AIDS.

One hundred and thirty million of anything is difficult to comprehend.

But 130 million is a little less than half of the people in the United States. To personalize that, imagine if every other person you live or work with suddenly disappeared. Who would do their jobs? Who would raise their kids?

These are real questions that scientists, activists, and public health officials grapple with every day of their lives as they try to stem the tide of this monstrous plague. Thirty million people have already died from AIDS, and in sub-Saharan Africa, where most of the deaths have taken place, the societal consequences have been devastating. As parents become too sick to work and

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care for their children, leadership of the household passes to progressively younger children, until poverty finally pulls the seams of the family bond apart.

Sometimes children are taken in by relatives who give them shelter and food in return for work, but such arrangements are usually inadequate, like a Band-Aid being used to stop the flow from a damaged artery. The AIDS orphans are usually treated more poorly than the foster parents' own children, and given meager food and little if any education. Even such small acts of charity, however, should be saluted, for in poor homes caring for AIDS orphans puts severe strains on already limited resources. One couple may try to take care of all of their siblings' children, or grandparents and great-grandparents are forced to care for infants and toddlers instead of enjoying their well-deserved retirements.

Some orphans, not lucky enough to have foster homes, join the roving bands of parentless children who now haunt the edges of most cities in the developing world. Many get involved in criminal activities—including prostitution and drug use—just to survive. In war-torn areas, many orphans are also at risk of being recruited into military units. There are already almost 20 million AIDS orphans in the world, and by 2010, that number is expected to more than double.

In addition to lacking food, education, and the subtle benefits of being raised by their own loving parents, these children also lack the cultural and social identity on which the world's political stability and technological progress depend. Exploits as horrific as those described by Golding in *The Lord of the Flies* are acted out by kids on the streets of Cape Town, Rio de Janeiro and Mumbai every day—all because their parents' lives were claimed by AIDS.

The Science of HIV/AIDS

Viruses are very strange things. Biology texts sometimes describe them as "non-living life-forms," but basically, they are organisms that need to hijack another cell's DNA in order to reproduce and spread. Whether they are deadly (like HIV or ebola) or relatively innocuous (like the rhinoviruses that cause the common cold), viruses and the populations of animals and plants that host them evolve together.

When viruses and their hosts interact over long periods of time, host populations sometimes develop partial immunity to them, and formerly deadly scourges kill fewer than in previous days. But that is not always the case. Some researchers think that viruses may incorporate random pieces of their host's genetic material into their own genomes. Over time, these viruses become quite large and by chance evolve to keep up with their host's changing immunity. Smallpox, with over 200,000 base pairs in its genome, may be one of these viruses. No one is really certain.

The Human Immunodeficiency Virus (HIV) is the virus that causes AIDS. HIV is a retrovirus—a type of RNA virus—that uses an enzyme called reverse transcriptase to copy its genome into the DNA of a host cell. HIV is transmitted by contact with the blood or body fluids of an infected person. The most common ways the disease is spread include blood transfusions, mother-to-child transmission, sexual contact, and needle sharing.

A transfusion with infected blood almost always results in spread of the virus, and children born to infected mothers have an up to 40% chance of contracting the virus—prior to birth, during birth, or through breastfeeding. The transmission rate of the disease through sexual contact ranges from 1 to 3%. Reusing infected needles results in infections less than 1% of the time.

When someone is first infected, it may take months or years for him or her to know that they are seriously ill, because many of the early symptoms of HIV are similar to those of a cold or flu.

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As the disease progresses, however, a type of infection-fighting white blood cell—the CD4 positive-t cell—decreases, leading to an irreversible loss of immune function. This period is marked by many illnesses or unusual "opportunistic" infections that healthy immune systems protect against. Examples of opportunistic infections include: certain types of fungal and bacterial illnesses, some lymphomas, and most commonly, tuberculosis.

Antimicrobial medications are used to treat opportunistic infections, but frequent, incorrect, or prolonged use of antimicrobials promotes genetic mutations that result in drug resistance in the infecting organisms. This often makes opportunistic infections more serious and difficult to treat, and may, in fact, drive the spread of resistant organisms in both HIV-positive and HIV-negative people.

Antiretroviral drugs to control HIV and antimicrobials to control secondary infections can prolong life, but eventually the immune system becomes so damaged that patients are considered immunodeficient and death usually follows in a few years.

No cure for AIDS is available, and so far no vaccine can prevent HIV; avoidance of high-risk behavior is the only proven way to prevent the disease.

The earliest cases of the virus we now know as HIV date back to the late 1950s and early 1960s[1], but scientists are unsure of when in the twentieth century the virus first began to infect humans. Most agree that the first people to catch the disease got it by eating chimpanzees. Recent research suggests that chimps may have gotten their immunodeficiency virus (Simian Immunodeficiency Virus—SIV) by ingesting a couple of different monkey species themselves. By comparing genetic sequences of SIV in chimpanzees, researchers noted that part of the virus resembled a virus from the red-capped mangabey and another part was similar to that of a virus from the greater spot-nosed monkey. The take-home message is watch what you eat.

From its origins in Africa, HIV has differentiated into numerous strains, subtypes and recombinant forms, and has spread around the world. Different subtypes of HIV infect people in different regions and countries of the world (see Table 1). Almost half of all infections are subtype-C strains (47.2%) (ref 2). Subtype-A is the second most common cause of infection (27%), followed by subtype-B strains (12.3%).

A generally milder form of the virus (HIV-2) also exists and has limited geographic reach—primarily in West Africa—and is less transmissible and less lethal than HIV-1. Patients with HIV-2 have lower viral loads and slower immune decay but acquire the same secondary infections as those infected with HIV-1.

A Few Words about Statistics

Reliable statistics on HIV and AIDS are difficult or impossible to get for many countries. UNAIDS maintains the most comprehensive database of information on the disease in the world, but the UN organization relies on official government statistics from each country—which sometimes understate the number of infected people.

Another important point to understand is that national HIV statistics (or statistics of any other disease) often do not reflect the extent of the disease in individual cities or towns. For example, national infection rates in southern Africa range from slightly over 13% in Mozambique to almost 39% of all adults in Botswana. Although these numbers are extremely high—and rising all the

[1] The lethal human immunodeficiency virus (HIV-1) was not characterized until the early 1980s, but blood samples from Sub-Saharan Africa in the 1950s and 1960s have been tested retrospectively and found to be HIV-positive

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Table1. Geographic Distribution of HIV Subtypes

Region or Country	HIV Subtype*
SS Africa	**A,D** (B,C,E. . .)
Europe	**B**
Americas, Caribbean	**B**
Indonesia, Philippines, Taiwan, Japan, Burma, Malaysia, Australia, New Zealand	**B**
China	**B** (C,E)
South Africa	**C**
India, Iran	**C** (A,B)
Central African Republic	**E**
Thailand	**E** (B)

Derived from Multiple Sources

* The subtypes in parentheses are present in the countries or regions as specified, but infect only a small percentage of patients. Subtypes in bold are the most commonly found, and infect an overwhelming majority (more than 80%) of HIV positive patients.

time—they mask the even graver fact that in some towns, over 75% of adults are infected.

Luckily, we have ways to slow or even halt the progress of this unrelenting killer. Such interventions as behavioral change programs and antiretroviral medication regimens have effectively controlled the spread of the virus in some countries, and continued vaccine research and trials hold the promise of prevention for the future. If we know how to stop people from becoming infected, why does the disease continue to spread? Why have some countries—like Uganda, Thailand and Brazil—reduced rising infection rates and kept them low, while other countries have not? The startling answer to that question is leadership. Some national leaders have made fighting the spread of AIDS a priority, and others have not. Those reluctant to combat AIDS must now learn that their societies may become so torn by AIDS deaths and the desperation of those infected, that in a few decades they may not have countries left to govern.

Behavioral Change Programs

Education and counseling programs to raise public awareness of HIV and how it is spread have long been implemented around the world. These efforts urge voluntary testing and teach safer sex—sometimes by encouraging fewer partners and by distributing condoms. They also attempt to destigmatize the disease, for HIV/AIDS is still associated with behaviors widely considered taboo, including prostitution, drug use, and homosexuality. Many HIV-positive people cannot tell others about their disease because they fear being ostracized by their families, neighbors, and friends, and losing their jobs or access to public services.

Behavioral change programs are cheap when compared to medical interventions, and have driven infection rates

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down in several countries. They are, however, labor intensive, because they require the mobilization of public health teams and require strong leadership at the highest national level to ensure their success.

Antiretroviral Medications

Antiretroviral therapy has temporarily staved off death and improved the quality of life for many of those infected. The downsides of their use are that rigid dosing regimes must be strictly followed and they are expensive—sometimes prohibitively so.

There are currently four major classes of antiretroviral drugs in general use: nucleoside reverse transcriptase inhibitors (NRTIs), nonnucleoside reverse transcriptase inhibitors (NNRTIs), protease inhibitors, and fusion inhibitors.

NRTIs function by inhibiting the synthesis of DNA by reverse transcriptase. The virus mistakes the drug components for natural nucleosides and subsequently incorporates them into the synthesis of viral DNA. When an NRTI becomes part of a strand of DNA, the addition of further nucleotides is prevented, a full-length copy of the viral DNA is not produced, and viral replication is interrupted.

NNRTIs also inhibit the synthesis of viral DNA, but rather than acting as false nucleotides, the NNRTIs bind to reverse transcriptase in a way that inhibits the enzyme's activity. Protease inhibitors bind to the active site of the viral protease enzyme and disrupt viral protein processing. Proteins are produced, but they cannot infect new cells.

The newest class of drugs is called fusion inhibitors, because they prevent HIV from entering target cells. Drugs of this class act by binding to the HIV envelope glycoprotein 41 and interfering with fusion to the target cell membrane.

NRTIs, NNRTIs, and protease inhibitors are available in tablet or capsule form, and are usually administered together as parts of complex drug "cocktails." Only one fusion inhibitor is approved for use in the United States. Enfuvirtide (Fuzeon) is principally used by people who have documented resistance to the other classes of anti-HIV medications. It must be injected twice daily, and costs each user between $15,000 and $20,000 dollars a year—factors that limit its distribution in the developing world.

Another factor which hampers the success of medication distribution programs overseas is the constant monitoring required for successful treatment. Patients must be typed; their viral loads and CD4-t cell levels watched; and the side effects of medications, along with growing resistance, scrutinized. Many countries have poorly funded and poorly equipped health care systems and access to quality care is unknown to most people. When private humanitarian and international concerns attempt to distribute antiretrovirals, they must sometimes build a health care system from scratch in order to do so.

In the developed world, where treatment regimes of this type are affordable and have proved successful in prolonging life, use of antiretrovirals is also complicated by a number of factors, including side effects, drug-drug interactions, and drug-resistant viruses.

Natural viral mutation coupled with the improper use of drugs (halting use, intermittent use, or habitually missed doses) has caused some strains of HIV to evolve resistance to antiretroviral medications. These resistant strains continue to reproduce and destroy immunity in the presence of medications meant to control the virus, and have already spread around the world.

HIV Vaccines

Advances in vaccine design have created a promising pipeline of candidate vaccines against HIV. But a vaccine to prevent the disease remains a promise to be fulfilled sometime in the next decade—if we are lucky. Until that time

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Table 2. Selected Clinical Trials of HIV-Vaccine Candidates

Vaccine Type	HIV-Subtype	Trial Stage*	Status
Canarypox	B	Phase II	Immunizations completed
Canarypox vector with gp120 boost	B	Phase II	Immunizations completed
DNA plasmid	B	Phase I	Immunizations completed
DNA plasmid	Multiple epitopes	Phase I/II	Enrolling
Non-replicating adenoviral	B	Phase I	Enrolling in United States, Puerto Rico, Brazil, Haiti, Malawi, Peru, South Africa and Thailand
Protein	B	Phase I	Immunizations completed
VEE vector	C	Phase I	Enrolling in US

Source: HIV Vaccine Trial Network

* Phase I trials are the first human tests of a candidate vaccine and are generally conducted on a small number of healthy adult volunteers. The main goal of phase I trial is to evaluate vaccine safety, but immune responses evoked by the vaccine are also analyzed. Phase II testing involves a larger number of volunteers (50-100) from the population where Phase III (vaccine efficacy) trials will be conducted. Phase II trials test whether a vaccine is effective in preventing disease, and usually occur in still larger numbers of people. Positive phase III trial results often lead to an application for licensure of a vaccine.

we must rely on behavior change programs and medications to control the spread of AIDS.

Initial efforts to elicit immune responses to HIV in uninfected people focused on recombinant protein subunit vaccines derived from envelope glycoprotein 120. Phase III efficacy trials were completed in 2002, but unfortunately these vaccines did not elicit adequate immune responses against HIV.

Other vaccine trials using the poxvirus vaccinia as a vector to deliver live recombinant HIV (based on glycoprotein 160) have been found safe, and have stimulated partial immunity to HIV. However, the potential dangers of using vaccinia in immune-deficient people steered HIV-vaccine research to recombinant viral vectors with very limited or no ability to replicate in human cells.

So far the most promising of these vaccines has been one using another poxvirus—canarypox—to deliver HIV recombinants (See Table 2). Several canarypox-HIV recombinants, alone or in combination with gp120 subunit vaccines, have been evaluated in humans. Those volunteers tested with the canarypox-HIV recombinant in combination with glycoprotein 120 boosts have induced HIV-specific cytotoxic t-cell responses in early trials. Phase II trials have recently been completed, and results are forthcoming. If these trials prove successful and progress to a wider Phase III trial, it will still about ten years before the vaccine is licensed for use—provided the results of the phase III trials are good.

The most problematic social issue in vaccine development is that early vaccines were designed to protect against the subtype-B, which infects less than 15% of all HIV sufferers. It is no coincidence that most people infected with subtype-B also live in the developed world where an established paying market for such a vaccine also exists. Vaccines to stem the tide of the pandemic

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in the rest of the world—using subtypes C and A—are only now being developed and are in the earliest stages of testing.

The Impact of Two Past Epidemics

AIDS is not the first infectious disease to affect the course of human civilization. The Justinian plague and the Black Death, both believed to be caused by the bacterium *Yersinia pestis*, had major demographic, social, and economic effects.

The Justinian plague, which originated in 541-2 in Southern Egypt or Ethiopia and spread quickly throughout the Byzantine world and beyond, was carried by rats and transmitted to humans by fleas and rodent droppings.

Modern medication regimens could have reduced the plague death rate to 5% or less. But antibiotics were unavailable in the sixth century, and the deaths from the Justinian plague left a severe impact on society. As farmers grew sick, food shortages began, and some of the sick died of starvation instead of disease. Inflation also soared as the taxation base shrank dramatically, and in an effort to economize, governments curtailed salaries and slashed civic budgets.

In his book *Plagues and Peoples*, (ref 3) WH McNeill posits that the Justinian plague, coupled with the other disasters of the time, reduced the population of the Mediterranean world by 30%, and led to the eventual collapse of the classical civilization.

After hundreds of years of apparent absence, the plague reemerged in the fourteenth century. From the 1330s to the 1340s, the plague swept through China and into western Asia along trade routes. In October of 1347, Italian merchant ships returned from a trip to the Black Sea, and when the ships docked in Sicily, many of those on board were already dying of plague. By the following August, the plague had spread as far north as England.

After several years, one third of Europe's people were dead, and the population did not reach pre-plague levels for over 150 years. Even when the worst was over, smaller outbreaks continued for centuries. The survivors lived in constant fear of the plague's return, and the disease did not disappear again until the 1600s.

Medieval society never recovered from the results of the plague. So many people had died that there were serious labor shortages all over Europe. This led workers to demand higher wages, but landlords refused those demands. By the end of the 1300s, guild and peasant revolts broke out in England, France, Belgium, and Italy. The Black Death led Europe from the High Middle Ages into the Renaissance.

The Impact of HIV/AIDS

The impacts of the two earlier plagues were felt more quickly than the changes wrought by AIDS. This is because those illnesses killed more quickly and destabilized the world in a few years instead of a few decades. However, we have reason to fear the future in a world where AIDS remains uncontrolled. The principal reason for concern is that the HIV virus predominantly infects men and women between the ages of 15 and 49, people who are bearing the next generation and who are in the most economically productive time of their lives.

In Sub-Saharan Africa, life expectancy has dramatically fallen because of AIDS, and will continue to fall for the foreseeable future. For example, in Botswana, where the HIV prevalence is almost 39% of the adult population, life expectancy will fall from 66 to 38 years of age by 2010 (see Table 3).

Infant mortality rates are also higher because of AIDS, reversing the successes brought by international programs during the 1970s and 1980s. In South Africa, the infant mortality rate in 2010 is projected to be over 20% higher than it would have been without AIDS. Deaths of children under the age of five are also expected to rise precipitously

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Table 3. Demographic Projections With and Without AIDS: 2010

Country	Life Expectancy (years)		Crude Death Rate (per 1,000 pop)		Infant Mortality Rate (per 1,000 live births)	
	With AIDS	Without AIDS	With AIDS	Without AIDS	With AIDS	Without AIDS
Botswana	**37.8**	**66.3**	**23.8**	**6.4**	**55.2**	**26.3**
Namibia	38.9	70.1	21.9	5.2	57.2	28.3
Nigeria	**46.3**	**64.9**	**16.1**	**7.1**	**57.4**	**41.4**
South Africa	**48.0**	**68.2**	**17.8**	**7.1**	**50.7**	**32.3**
Swaziland	37.1	63.2	22.6	7.5	85.3	58.6
Tanzania	46.1	60.7	16.3	8.9	77.8	65.2
Uganda	47.6	59.5	14.4	8.8	68.6	58.5
Zambia	37.8	60.1	21.5	9.0	81.7	58.4
Zimbabwe	38.8	69.5	22.5	4.9	53.7	24.0
Brazil	67.7	75.5	8.5	5.4	22.3	18.4
Thailand	72.9	75.1	7.4	6.5	18.7	17.8

Source: U.S. Bureau of the Census (ref 4)

because of AIDS.

These factors, along with decreased fertility due to illness, will cause mortality—or the more measurable crude death rate—to rise. In the case of Nigeria, where the HIV prevalence is above 5% of the total adult population, the crude death rate will be over twice as high as it would have been without the scourge of AIDS. Population growth will falter and eventually decline as the number of adults having children falls.

Scholars cannot agree how to measure the economic impact of HIV/AIDS (ref 5). Many estimates suggest that AIDS might depress a severely afflicted country's gross national product by a percentage point or two, with most costs arising from caring for the ill and their dependents. Small effects like this can be compensated for by policy changes or by moving monies from one budget line to another. So the macroeconomic impact appears to be quite small—at least so far.

The effect on individual businesses and corporations is, however, much more significant. Some businesses in areas hard hit by the pandemic find the absence of sick workers, the costs of paying their medical expenses, and the eventual loss of trained and skilled employees very hard to bear (ref 6). The costs have been so high that some companies are now getting into the HIV-prevention business by instituting voluntary testing programs and counseling workers and their families on how to avoid the disease.

The economic impact of AIDS at the household level is only just now being studied. Researchers cannot project what they will find, but they all suspect that it will be extreme. One of the issues under consideration is how property and durable goods change hands when parents die from AIDS. If their children are old enough to farm, the goods usually pass to the eldest child. But what happens when children are too young to

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farm the family land? Do the goods stay within extended families, or are they sold to an unrelated third party? If an unrelated third party is buying up the land at fire-sale prices, will this lead to the birth of a new landed class? Will modern corporate farming finally get a foothold in the developing world? Will sharecropping be introduced or spread and will formerly independent farmers be bound to the land in abject poverty? No one knows the answers to these questions, but all agree that they are important to ask.

The social consequences of this epidemic will be difficult for the survivors to manage. The ill and the orphans will make up a much larger portion of society than they do today, and fewer healthy people will be left to care for and support them. Poverty in the most highly infected areas will skyrocket and the gap between rich and poor will continue to increase. Violence—both against the infected and in society at large—will also continue to rise.

My work has taken me into the clinics of the developing world and I am well aware that AIDS patients are not monsters or vampires. They are fellow humans suffering under the weight of a great plague and in desperate need of our help. I have also seen *Coffins R Us* stores open their doors for business in many major cities. These shops hawk coffins of all sizes and prices and in many instances cannot keep up with the ever-rising demand. Over the years, I have grown frightened of the societal consequences of all this needless death.

In some areas in southern Africa with high rates of infection and few prospects for prevention and treatment, the people's desperation is expressed through marked increases in substance abuse, robbery, rape, and murder. In Botswana rape of girls under the age of 16 rose 65% between 1997 and 1998. In Harare, Zimbabwe, an average of 100 sexually abused children a month came to a single clinic in 2000. Over half the children were under 12 and over 300 were under five—the youngest was just a few months old.

Two Future Scenarios

So what shall we do about AIDS? Should we in the developed world continue to ignore the pandemic as ravaging only distant lands, or people that perhaps the world would be better off without anyway? Should governments in countries hard hit by HIV continue to neglect the suffering of their own people in favor of other priorities? Or should we all realize that the problems of the multitude of people infected with HIV are also our own problems?

One future scenario, which is well within reach, has us stemming the tide of the disease through internationally implemented programs to teach behavior change and extend the lives of infected adults with medications so they can nurture and teach their children. In the near term, a vaccine to prevent the disease remains only a tantalizing promise.

If, however, we do nothing at all, epidemiologists predict that HIV infections will continue to rise until almost half (42-44%) of all people between the ages of 15 and 49 are infected (ref 7). Then the rate of infection will begin to fall because there simply won't be enough new people to infect, and HIV infection rates will eventually stabilize with one-third of all adults in endemic areas dying early deaths from the disease. The Earth's current population numbers around 6.3 billion people. By 2025, the population is projected to be almost 8 billion, and a little less than half of those people will be between the ages of 15 and 49. Can we really risk having a billion people on an AIDS death sentence?

The pockets of extreme poverty and disorder already evident in areas hard hit by the pandemic would become commonplace, and the numbers of AIDS orphans would swell into the hundreds of millions. Anarchy and violence would increase as numbers of infected rise, and

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as in *The Lord of the Flies*, Jack's stick "is sharpened at both ends."

But violence will not be limited to areas of high infection. Even countries with little disease—like the United States with its .06% national infection rate—may suffer as people lash out at us for "not doing enough to help" and excuses for terrorism continue to grow.

More frightening still is that the first generation of AIDS orphans—children raised only by each other and the streets—will have come of age. What sort of societies will they construct? What sort of world will they lead?

The chilling conclusion of *I Am Legend* depicts the emergence of a group of people infected with the *Vampirus* bacillus but who retain their human appearance and forego drinking blood by supplementing their systems with drugs. They declare themselves the true plague survivors and vow to destroy the vampires and rebuild the world. But Robert Neville, the lone man immune to the disease, is appalled by the brutality with which they slaughter the infected. He watches in shock as men accustomed to extreme violence methodically butcher the vampires outside his home. Neville is startled to realize that he feels more compassion toward the vampires than he does to their executioners. Eventually, he quietly takes his own life rather than face the spectacle of a brutal public execution at the hands of the masters of the new world. Society, he discovers, is a social construct of the majority, and to the end Neville remains an army of one. ■

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MIDNIGHT ON TABULA

Catherine Shaffer

Getting people to say
they want something, and to act as if they do,
are two quite different problems.

"Would you marry a midnight man, Nyssa?" said Reese, kicking the great tree branch the girls sat on.

Nyssa's head snapped up in shock. "What?"

"Someone really dark, like my mother?"

"Yes, of course!"

"Your babies would look like me. Light and dark mixed together."

Nyssa nodded cautiously, sensing a trap. Best friends or not, Reese could be as ruthless as a sunscreecher with the scent of blood in its nostrils. "Light and dark don't matter on Tabula."

"Would you marry a brown man?" Reese continued, bobbing her toes up and down casually.

Nyssa cringed. "Yes . . ." she answered. "If I liked him."

Reese pointed to the arch of her foot, where her dark cocoa skin faded into the pale white of the sole of her foot. "With your complexion, the babies would have skin this color," she said. "That's very pretty."

The conversation made Nyssa uncomfortable. What if someone found out? Besides, it was too serious. They were ten Tabulan years old, or twelve by Terran standards. She might be married in another two, and having babies. Mom had told her once that back on Earth, most Americans didn't even get married until they were thirty years old. Thirty! It was like waiting a whole life. Nyssa couldn't imagine it. Then again, it was even harder to imagine herself all grown up with people calling her *Pia* and everything. She didn't want to think about it. She wanted to enjoy the leafy silence of the treetops.

"Would you marry a chiney man?" Reese asked.

Nyssa flinched. Her heart pounded as she glanced toward the forest floor. The word *chiney* was forbidden. It was impossible that anyone would be nearby to hear them, but Nyssa worried anyway. "Yes, I guess so," she whispered.

"Ewww!" Reese squealed, punching Nyssa in the arm. "You would marry a chiney? Why would you do that? Just like that boy Joey!"

"Shhhh!" said Nyssa. She gripped the finely corrugated bark of the tree beneath her and contemplated the climb back down. "Stop saying those things."

"Stop saying that," Reese mimicked.

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"You act like you don't notice any difference, like you believe all that stuff they tell us, about everyone being the same, everyone being Tabulan."

"Not completely the same. Ninety-nine point nine percent the same." Nyssa had given the wrong answer. Reese had tricked her into admitting she would marry a chiney. She hadn't known that Reese didn't like chineys, but Reese knew many things that Nyssa didn't. Whatever was wrong with Joey and the other chiney was most likely obvious to everyone but Nyssa. She didn't want Reese to think she was stupid. She blinked back tears.

"Let's go," Reese said, and, satisfied, she smiled, then began climbing down out of the tree.

Nyssa needed help getting down, because she wore a prosthetic leg, but Reese never made fun of her for it. For all of Reese's teasing and bossing, it was her one kindness, and all that mattered to Nyssa.

They made the long walk back to the settlement in silence. They ducked through a doorway carved into the living tree, and popped out into civilization. The colony sat atop a plateau in the mountain jungle: short, dome-shaped houses mixed with a few timber-constructed buildings; terraced agricultural fields cascaded up and down the surrounding hillsides; the colony Lander squatted on a concrete pad in the distance.

"I have an idea," said Reese.

Nyssa sighed, but Reese had already run off in the direction of the school dome. She followed, hoping they wouldn't be home late.

Glancing around first to see that no one was looking, Reese slid the schoolhouse door open and went in. She beckoned to Nyssa. "Come on, don't stand around outside. Someone will see you!"

Nyssa slipped inside. It was strange at first being there after hours. Reese sat down at the teacher's desk and started playing with the computer. She pressed a button, and the monitor swelled to a translucent bubble. Icons appeared on the bubble's surface, which Reese manipulated at random.

Nyssa opened the supply closet and rummaged through the boxes of art supplies, educational cartridges, library disks, and the treats the teacher saved as rewards. She peeled the foil wrapper from a forbidden chocolate bar and shared it with Reese.

After failing to crack the teacher's password, the girls admitted they were bored. Being at school after hours was not much different than being there when class was in.

Then Reese turned to the chalkboard and began scribing words onto its surface. The board was programmed to respond to direct contact with the stylus, or to display input from the computer. Nyssa squealed when she saw what the words were. Her heart pounded in her throat and she wanted to run away.

"Reese, if we get caught—"

"We won't get caught. What's wrong with you? Are you afraid?"

Nyssa stiffened. *You're not supposed to even know those words!* she thought. But if she told Reese that, then Reese would think she was a baby, or stupid, and then her last friend would have nothing to do with her. "No."

"You never heard words like this? Don't your parents use them when they think you're sleeping?"

Nyssa shrugged. "Sure. All the time," she lied.

"Then show me," Reese said. "Which ones have I forgotten?"

Nyssa moved over to the console and stared at the list of obscenities. *A pop quiz on naughty words*, Nyssa thought. *What else should I expect?* It was more than a pop quiz. It was an inventory. A catalog of coolness.

She glanced at the door, then at Reese standing between her and the door. Then inspiration struck, and she typed *oriental* onto the screen. She had learned that word from some old Earth

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books. It would have to do. Reese gave her an approving smile.

A clicking sound at the door startled them. "What was that?" whispered Reese.

Nyssa had no time to answer, because there was another click, followed by a scrape. They fled out the back.

Nyssa got home almost too late for dinner. Their house was a one-room dome, like most of the colony houses. Someday, Father would build them a house of wood.

The afternoon sunlight filtered through the light material of the dome, feeding the microscopic solar cells that covered every centimeter of it. The house generated its own electricity, and automatically regulated the air temperature and quality inside. There was a place in the middle for a stove and chimney, but they didn't need it, living in the tropics.

Mother cooked on a tiny burner in the kitchenette that occupied the center of the dome. "Where have you been?" she said. Her eight-months-pregnant belly was splattered with grease. Shiny brown hair fell to her waist in subtle waves. A few strands of it had been braided with brightly colored threads: blue, yellow, red.

"I was playing with Reese."

"Couldn't you play with the other kids sometimes?" She swirled the air with a spoon.

"I don't know."

Six yelping puppies rushed to greet Nyssa. She laughed and rolled around the floor with them while the mother dog ambled over and gave her a more leisurely greeting, poking her cold nose in Nyssa's ears and snuffling. "Lady!" she said.

Nyssa's mother was the Chief Biologist for the colony. She had spent the past decade working on livestock, nematodes, plants—everything that the colony needed for survival. Finally, the year before last, she began a project with no practical application, except that of bringing joy. She entered the suspension modules of the colony's Lander where a Noah's ark of earthly animal breeding stock slept, and she brought forth a dog—an exuberant, shaggy, yellow dog who was Nyssa's second best friend in the world.

Nyssa's father laughed to see her lying on the floor in a pile of puppies. She stood up and gave him a hug, then stared at him very hard for a minute.

"What is it, Nyssa?"

"Daddy?"

"Yes?"

"Is my little brother going to be . . . different from us?" She meant *chiney*, but she couldn't say it.

Nyssa's father sighed, and pulled her up onto his lap. He had shaggy midnight hair that contrasted sharply with his tidy beard. "You see those puppies, Nyssa?"

She nodded, glancing over at the puppies who had waylaid their mother for a spontaneous nursing session.

"What color are they?"

"Four are yellow and one is midnight and one is sort of brown."

"Does the mommy care which one is yellow and which one is midnight?"

"No. She doesn't even know about colors," Nyssa answered.

"That's right, sweetheart, and you shouldn't, either," he said. "Here on Tabula Rasa, we all promised each other that we weren't going to care about people's colors any more than one dog cares what color another one is. Midnight dog, yellow dog, no difference. They only care how you smell."

When the colony ship lifted off for Tabula Rasa, colorblindness was first on its charter for the new society. Still, Reese's mocking laughter haunted Nyssa. A chiney person might be very nice, but Reese had made it clear that it would be a humiliation to have one in her own family. She couldn't bear it if her baby brother was chiney.

"So, you see," said Nyssa's father, "our baby will be Tabulan. We don't know

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whether he will have brown hair or blue eyes or midnight skin, but we know we'll love him so much we can't stand it. You'll see."

A rooster picked at a kernel of grain in the dust near Nyssa's feet. She shooed it away and it went flapping and clucking across the bare dirt yard in front of Reese's house. Nyssa's head bobbed side to side as Reese, sitting one stair step above her, yanked at her hair with a brush. Reese's younger brothers and sisters tumbled about the yard, clambering up and down the porch steps, wandering inside and out, mingling with the chickens. The two older girls were babysitting while Reese's mother had a visit with the doctor.

Like Nyssa's own mother, she was expecting a baby and needed to see the doctor once a month. There were so few people on Tabula that every baby was precious.

Nyssa wished she were a member of this big, lovable family. The house was always full of laughter, and they had a real, wooden house, not a collapsible prefab dome like Nyssa's. It was built on four sturdy posts, spaced well apart. The walls were woven canvas screens that let in a buttery light at sunset and there was a wide porch that wrapped completely around it. The whole family hung their hammocks outside on the porch, beneath the broad, leaf-thatched roof.

Nyssa sometimes slept over with Reese, nestled beside her in the same hammock, foot-to-head and head-to-foot. Reese joked she got the better part of this deal because Nyssa had only one foot when she took her prosthesis off. Sleeping out in the cool night air, listening to the wind blow in the jungle and the soft, distant birdsong was the most wonderful way to sleep that she could imagine. It was so much better than her hot, stuffy dome house.

A giant spinning wheel occupied one side of the house's interior. Reese's mother, Kendra Connor, saved credits by making all of the children's clothes out of a flax-like native plant that she spun herself. By doing this, the family received extra self-sufficiency credits that they then used to buy milk, meat, grain, medicines, and other commodities.

Not that they had to buy everything. The Colony Supervisor sometimes said, "From each according to his ability, to each according to his need." Nyssa thought it was a nice sentiment, but it always started a big argument at community meetings and her father would come home angry.

Reese combed Nyssa's long, soft hair and styled it into elegant curls. Reese had short, wiry, wild hair and was always wanting to brush Nyssa's hair. Nyssa didn't understand the fascination and would rather have had hair like Reese's. She would have liked to wear it in rows of tiny braids like the Connor girls did, and not have to brush it every day.

Reese's father came around the corner leading her mother. The children called the adults by their colony titles—*Pioneer* and *Pioneera* or Pio and Pia for short—so when they came near, Nyssa chirped, "Hello, Pio Connor! Hello, Pia!" Pia Connor had dark brown skin, darker than Reese, and her father had very pale skin, almost as light as Nyssa's, and straight midnight hair.

There was something wrong. Pia Connor was sobbing. Some of the children ran to their mother as she approached the house, leaning heavily on her husband, but she walked past them while her husband held her. They ignored the children and went inside.

Nyssa could hear Reese's mother crying and screaming, and her husband's muttered reassurances. Reese got up, leaving Nyssa's hair half braided, and tapped on the closed door. In a timid voice, which Nyssa had almost never heard before, she asked, "What happened?"

The crying rose in volume and pitch while Reese's father opened the door and stepped out. All of the children

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were quiet, even the youngest.

He looked around and his gaze fell on Nyssa. Firmly, but not unkindly, he said, "You go on home now, Nyssa."

Relieved, Nyssa ran back to the little row of dome houses where her family lived.

That night, Nyssa woke suddenly to Lady's alarm bark. Someone was at the door. She lay in her hammock wearing only her underwear. She slept fitfully in the stifling heat of the house. Her prosthesis lay on the floor beneath her. Father was in his own hammock, but Mother was still awake, squinting at the display floating on the bubble surface of her computer and rubbing the top of her tummy absently. She wore the earpiece she used when she needed to upload DNA sequences into the microchip implanted in her brain. Mother often bragged about how many millions of base pairs of DNA she could analyze using her implant. She worked late a lot of nights that way, planning the sequences of the DNA inserts she would need for her latest project.

Father put on a pair of trousers, the kind with real metal buttons and a zipper, and opened the door. It was Pia Lucy Ahn, the Colony Supervisor. She brought cool, moist air with her into the house along with the smell of bloodflowers and honeyweed that bloomed after dark. Lady climbed out of her bed box and rushed over to greet the guest, her tail flapping behind her.

Pia Ahn backed away with a look of disgust on her face.

"Some people say that the wagging of a dog's tail is a sign of happiness," Father said. "But really it's a sign of indecision and great emotionality." He grabbed Lady by the collar and dragged her away from Pia Ahn. "The dog may be torn between wanting to jump up and lick your face, and wanting to hang back and wait for you to make the first move." He led Lady to her bed box and knelt to stroke her head as he continued speaking to Pia Ahn. "On the other hand, a wagging tail could mean the dog is wondering whether to go for the throat or the groin first."

Pia Ahn grimaced and took a step backward.

"Now, now, Peter, you know that dog wouldn't hurt anyone," said Mother. "Please sit down." Mother brought a chair out for Pia Ahn and helped her out of her shiny blue jacket. Pia Ahn apparently didn't need self-sufficiency credits because she always wore rare synthetics like the beautiful blue jacket, even though it must have made her hot. It would be decades before the colony had enough resources to manufacture polymers.

"I came to see how you're progressing on the human genetics, Naomi." Pia Ahn crossed her legs as she sat down on the bamboo chair.

"I've already told you, the soybean project has highest priority right now. There's a new virus wilting the plants before they reach maturity."

"But certainly you can find time to work on the problems we discussed. It's never too early to avert disaster. We can't risk a founder effect at this stage of the colonization."

Nyssa knew from school that the founder effect was the loss of genetic variability that occurred within a population of colonists or survivors of a catastrophe. Once lost, certain important genes could never be regained. The colony would falter and die.

"I've looked over your figures, Pia, but I can't draw the same conclusions. I see no need to dabble in the genes of already healthy human embryos."

"But if we could screen them properly," argued Pia Ahn, leaning forward with one hand raised toward Mother, "for genetic diseases . . . just imagine the risk. Even one seriously ill child. How could we provide the health care?" She lowered her voice. "Just look at the sacrifice we've made to provide one disabled child with prosthetic devices."

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Father stood up suddenly. Nyssa's heart pounded. They were talking about her. "That will be quite enough."

Nyssa ducked her head under her cover. Mother's voice sounded hard when she spoke. "I simply don't have the time for unnecessary projects, Pia. Now, if you'll excuse me, I have several thousand more codons to screen for mutations."

Mother and Father were quiet for a long time after Pia Ahn left. Nyssa had never thought of her prosthetic leg as a sacrifice for the whole colony. She was fitted with a new one each year, and the old one recycled. How much trouble could that be? She lay still in her hammock, feigning sleep and thinking.

Mother and Father must have thought she was asleep, because they began to whisper. "I think there's more going on here, Peter."

"What do you mean?" said Father in the darkness.

"Kendra Connor miscarried her pregnancy today."

"So? It happens sometimes."

"She was at the clinic when it happened. What if they did something to her? To make it happen."

"How could they do that? Why would they?"

Mother's voice got even softer. Nyssa could barely hear her. "Race."

Father was quiet a long time. "Not this again. We've already had this discussion. A statistical anomaly—"

"Yes, I know. Correlation does not equal causation. But we wouldn't know if we never asked the question. What are the odds that out of over a hundred babies born from frozen embryos none of them would be black?"

The forbidden word, *black*, rang in Nyssa's ears. It was so ugly, so impolite, so charged, that ordinary things like the sky at night and the soil underfoot couldn't be described with it. You said "dark" instead, or "deep gray," "thick brown," "midnight blue," anything to avoid the word *black*. She remembered what Reese said about the words parents whisper when they think the children aren't listening.

"What is black, Naomi? You can't even define the terms you're using. They have no scientific validity. You're talking about a conspiracy and you have no evidence to back it up."

"You and I both know what black is and the only black children in this colony have been born naturally in families like the Connors—"

"They're not black, Naomi. Even on Earth they would have been considered biracial."

"Biracial, then. It's close enough for Lucy."

"What does Lucy have against midnight people? She signed the charter like the rest of us. She left her baggage back on Earth, just like you should have. For that matter, what do you have against Lucy?"

"We were roommates in college," said Mother. Nyssa's eyes opened in the dark under her blanket. She had not known that. She tried to imagine what Mother and Pia Ahn would have looked like as college students. "Lucy was an orphan. Her parents owned a Korean grocery store in San Francisco. One day, a young . . . midnight man, high on heroin, came in and robbed the store. He walked away with a hundred dollars in cash and both her parents' lives."

"She's a grown woman, Naomi. She knows the difference between a random robbery that happened forty years ago and what's going on here. She understands the principles that our colony's founded on, and she believes in them."

"Think how you would feel, Peter. Think of it. Sitting in a courtroom for an entire month, looking at the face of the man who killed your parents. How could you not care what color he was?"

They stopped talking and Nyssa went to sleep, feeling ashamed without knowing why.

The next morning, Nyssa woke very

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early to find her mother up already, wearing the same clothes she had the night before. She looked very tired, but also excited. The kitchen was crowded with steaming, covered dishes.

Nyssa's father rolled out of bed and stretched. "Beth? What have you been doing?"

"Some cooking, some cleaning," answered Mother. "I'm going to take some casseroles over to the Connors' today." She took another dish out of the oven and cursed as she set it on the range top. She unwrapped her hand and shook it, blowing on the fingers.

"You're tired. You've hurt yourself. You need some rest."

Mother winced and massaged her belly. "I just don't feel like it. I can't sleep."

Nyssa rolled out of her hammock and ran to Lady's box, where the puppies were tugging on their mother's ears and tail with their teeth. "Are they ready to leave their mom yet?" she asked.

Father came to stand over her and Lady in her wooden whelping box. "They're just about weaned now. Their eyes are open. They can run and jump and chew. I believe so."

"May I give one to Reese?"

"She may not be feeling like a puppy right now, Nyssa," Mother interrupted from the kitchenette where she was removing another pan from the oven.

"She would love it, I know she would. She couldn't wait until the puppies were ready to go." Nyssa looked at her father. "Please, Daddy?"

"I suppose," he said.

Nyssa washed, dressed, and ate breakfast in a hurry. She had time to go to Reese's house before school. She picked out one of the yellow puppies, the one with the dearest, sweetest, brownest eyes, and ran all the way to the Connor house.

Reese answered the door, but didn't let her in. Her eyes widened when she saw the puppy, and she almost smiled. "I brought this for you," Nyssa said. "I'm sorry about what happened to your mother."

Reese looked at Nyssa silently, then she looked at the puppy, and looked back at Nyssa. "We lost a baby, and you bring us a puppy?" she said, then slammed the door.

"Reese!" Nyssa called. "Reese?"

The door opened again. It was Reese's father. "She doesn't want any visitors right now," he said. "I'm sorry."

Nyssa returned the puppy to its mother and made the short walk to the schoolhouse. She shuffled along, staring at her feet as she walked. One good foot, one fake foot, one good foot, one fake foot. She didn't look up until she was sitting at her desk and noticed the unnatural silence in the schoolroom.

There, emblazoned on the white overhead screen at the front of the class, in fluorescent green letters six inches high was written:

BLACK HISPANIC CAUCASIAN LATINO DIVERSE BIRACIAL ASIAN PACIFIC ISLANDER EXOTIC URBAN CHINESE ETHNIC oriental

Nyssa recognized her own handwriting on the last word: oriental. She shrank in her chair. She couldn't even bear to look at the awful words. She felt like an accusing finger was pointing at her from the sky. Blood rushed to her face and tears stung her eyes. Did they already know who had done it? In detective stories, they always dusted for fingerprints. She wondered if the Colony Council had her fingerprints on file.

The teacher spoke from the back of the room. "Children, please leave the school immediately."

Nyssa waited outside while the Colony Emergency Team walked in and out, taking notes and recording images. These were ordinary citizens who were trained in first aid, firefighting, and other emergency procedures. Nyssa couldn't remember the last time their services had been invoked.

She heard them talk about "hate" crimes and speculate that it was related to the "problem" with Pia Connor. Nys-

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sa wondered if she should tell them what happened. It had been Reese's idea to write the words on the screen. And Nyssa thought that Reese had erased it before they ran from the classroom. It was a prank, not a hate crime. But she couldn't tattle on her best friend.

It was something Nyssa had never understood. Adults wanted children to behave and cooperate, but when one of them did something wrong, they were supposed to hide it and not tell. She supposed that loyalty to a friend was more important than obedience. She would not betray Reese.

A small voice inside her whispered that it wasn't tattling to tell on yourself, but Nyssa smacked it down and refused to think about it anymore.

She sat in a circle with the other children her age. The relative cool of morning gave way to the merciless heat of midday. In the schoolyard, where there was no shade, the sun beat down hard. Even the creatures of the forest had quieted.

The colonists had left a large lot empty for a playground and tried to cultivate Earth grasses in it. The experiment was successful only in part. It was a checkerboard of different strains of grasses. Some of them grew well, and some had died, leaving nothing but dust. One large square contained a kind of grass native to the planet. It grew in clumps that wandered, following the sunshine throughout the day. As slowly as the hands of a clock, a single tuft of grass could travel several meters in the course of an afternoon. It was here that the children convened, the wayward grasses corralled into a circle for seats.

"Did you hear what happened to Reese's mom?" said Samantha Kean.

"What?" said Joey. He looked a little like Pia Ahn. Chiney. When Nyssa looked at him, she felt even more guilty for adding "oriental" to the list on the wall.

"Her mother had an *abortion*," Samantha answered.

"What's that?"

"They take a long metal hook and stick it up . . . you-know-where and cut out the baby."

"No they didn't!" said another girl. "My mother told me her baby died and there was nothing anyone could do."

"I heard that there was something wrong with the baby. That it was *deformed*."

The circle was suddenly quiet. Some of the kids looked at Nyssa. Most of them looked at everything but Nyssa. A spider began to trill in the forest, and a breeze wafted past, teasing the children with the promise of relief.

Nyssa was angry. It was wrong for them to call her deformed because of her missing leg. Mother and father had said so many times. Even if they weren't saying it directly, they were all thinking it.

Then, with a sudden lurch in her stomach, Nyssa realized how she would feel if someone had written a lot of words about amputees on the schoolroom wall. Words like "deformed" and "crippled." She looked at the faces of the children in the circle. Some of them were pale and pink like her own, but at least half could have been described by the words she and Reese had written on the chalkboard in some way. Were they frightened?

The thought that she should confess troubled Nyssa again, but she ignored it. She couldn't betray Reese. That was the most important thing. If it weren't for Reese, Nyssa would have never done anything. How could Nyssa be faulted for obeying someone so much bigger and stronger?

Reese's younger sister, Raisa, sat two tufts over from Nyssa. She had been quiet the whole time, but suddenly she declared, "Our baby wasn't sick! It didn't die! It was the doctor that did it. Him and Pia Ahn and those other *chineys*. They killed our baby."

Silence passed around the circle like a

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virus. Some of the kids turned white and some of them tried not to look at Joey like they had been avoiding Nyssa's eyes just a minute before.

"Let's play softball!" said Joey. Nyssa wished she had been brave enough to say that when the subject of deformities came up.

They called the younger children over and began picking teams. Joey was captain of one side, and Samantha the other. The rest waited in a line as each captain took turns picking players. Nyssa was the last person chosen. Even Raisa, Reese's little sister, was picked before she was.

Samantha got Nyssa by default. "All right, but we get to bat first," Samantha said. "No offense, Nyssa," she added, offhandedly.

Nyssa was last in the batting queue and she didn't get a turn the first inning. When Samantha's team was in the outfield, she was assigned a spot next to a more competent player. She stood scuffing her toe in the dirt. She had always survived by fading into the background, not being noticed, not drawing attention to herself. It was lonely, but at least it was safe. There would be no one laughing at her if she screwed up.

One of the batters hit a ball toward Nyssa, but before she could catch it, the boy standing near her pushed her out of the way and got it himself.

While they played, the Emergency Team called the children one-by-one into the schoolhouse.

Several innings later, Nyssa sat on the bench while her teammates batted. Nyssa watched Joey pitch. Like most of the kids, he wore a simple homespun tunic and trousers. He was a lean, athletic boy, tall for his age, and the bones of his shoulders protruded sharply from his tunic. His midnight hair gleamed in the sun and he moved with confidence and grace when he pitched the ball.

He was chiney, and he wasn't mean like Pia Ahn. Nyssa didn't see what would be so wrong about marrying Joey, or having him for a brother. Maybe it was something only Reese cared about.

One of Joey's team tagged one of Samantha's team as he slid into home plate. They argued a minute, then decided he was out. Samantha waved her team up and into the outfield.

"Wait!" said Joey. "Why hasn't Nyssa had a turn at bat?"

Samantha stopped in mid-stride. She gestured toward Nyssa. "You know . . ."

"No, I don't," said Joey. "Let her try it."

"But we've had our three outs."

"It's okay with us," Joey said, glancing around at his teammates. "Right, everyone?"

Raisa was on Joey's team and she spoke up right away. "Let Nyssa do it!"

Embarrassed, and not entirely willing, Nyssa went to the plate. It wasn't really a plate, but a roughly square piece of tree bark. Joey walked over from the pitcher's mound and showed her how to hold the bat. It was a piece of wood, nothing like the smooth aluminum bats she saw in pictures on the computer. It felt hard and heavy in her hands.

Joey pitched a dozen times, running back to the plate twice to readjust Nyssa's grip. She finally hit the ball on his sixteenth pitch, sending it fast and low to center field. With a squeal, Nyssa tossed the bat down and ran as fast as her legs would take her to first base. It was a lot faster than they thought she could go. But the clump of grass that was first base wasn't where she remembered it. She looked up to see it had moved toward the forest. The boy playing the first base position caught the ball and stood in her way, trying to tag her with it.

"It moved!" cried Nyssa.

"That's the rule," Joey shouted. "You play them where they lay."

Nyssa dodged to one side, then stepped down on her prosthesis and *pushed*. In an instant, hundreds of tiny pistons extended and contracted. The

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leg-shaped plastic and metal device thrust her high into the air, where she somersaulted over the first baseman's head and landed neatly on the tuft of grass that represented the base.

She stood panting and smiling, safe. All of the children were gaping at her when an Emergency Team member called her out of the game.

Torn, she hesitated before giving up her spot on first base. "It's okay, Nyssa, we'll play again tomorrow!" said Joey.

Nyssa sighed and followed the man into the schoolhouse and sat where he told her to. She felt uncomfortable in another student's space. The Emergency Team man sat next to her. "I'm Richard," he said. "And you're . . . Nyssa Christopher?"

Nyssa nodded.

"We'll get started in a moment," he said. He wore lightweight, all-purpose wool trousers and an off-white, kimono-style shirt beneath a scarlet, thigh-length wool jacket. Beneath the jacket, belted over his shirt, he wore a weapon. Nyssa had seen him around. He worked on the aqueduct project pouring concrete, and sometimes he played the guitar when there was a dance or party. Nyssa never knew he was on the Emergency Team. Seeing him with a gun made her afraid of him.

Pia Ahn entered the room, still wearing her shiny blue jacket. She had a skirt on and under her skirt she had a strange kind of pants that Mother called "pantyhose." Mother didn't think much of pantyhose, but Pia Ahn's legs looked very smooth under them and Nyssa wished she had a pair.

She sat down opposite Nyssa and began asking questions while Richard took notes.

"Nyssa, where were you yesterday after school?"

Nyssa glanced at the front of the classroom where the computer and overhead projector were. "I was with Reese Connor collecting food in the forest," she said.

Richard wrote it all down, and Nyssa felt herself blushing because it was a lie.

"Did you see anything unusual when you left school? Was anyone loitering?"

Nyssa shook her head and trembled. What if someone had seen them? Then they would know that Nyssa was lying.

"How about early this morning, before school?"

Nyssa shook her head again.

"Has Reese or any of the other Connor family ever said anything intolerant about people who . . . look different?"

"No, never!" Nyssa said, too loudly. Nyssa wished Reese were there to explain what had happened.

"That will be enough," said Nyssa's father. He was standing in the doorway with Reese's father. "Who gave you permission to interrogate these children? They should have had a parent present."

"We were asking a few simple questions, Pioneer Christopher," said Pia Ahn.

"Next time, ask permission," said Pio Connor. "Where is my daughter?"

Nyssa wanted to tell him that Reese hadn't been in school all day, but she was too afraid to speak with so many adults in the room. Instead, she waited while they found the teacher, who told them that Reese had not come in at all.

Reese was going to get in trouble, Nyssa realized, and there was nothing she could do to stop it. At least she had been loyal.

Mother didn't work that day. "She went for a walk," Father explained. Outside, the shadows were getting very long. He fussed over a spaghetti sauce, talking to himself. "Why didn't they bring oregano? We had to have quinoa seeds. God forbid we set off to another world without quinoa. But no oregano? And what I'd give for a decent Cabernet Sauvignon."

Nyssa flung herself into her hammock.

"Cabernet for the sauce, and, oh, this would be perfect with a '42 Chilean

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Pinot Noir."

"Daddy, am I deformed?"

Daddy stopped stirring his sauce and sat down on the floor next to Nyssa's hammock. She felt his big hand cupping her leg, her good one, warm and comforting. "Deformed is a horrible word. Your body is just a container for your soul. Your soul is perfect, Nyssa. It's one of the best I've ever seen. But your container has a design flaw." Daddy's face turned red. "Who told you that you were deformed? I'll speak with their parents."

"Nobody, Daddy. No one said anything. I just thought that must be why you and Mom are getting a baby from the ship instead of having one natural."

"Our ship only brought three hundred people in cold sleep. That wouldn't be enough. The colony needs genetic diversity. But instead of sending thousands of people on the ship, they sent thousands of embryos. It's very important that we use the genetic diversity that's in those embryos."

"But what about the Connors? They had all their babies natural."

"Pia Connor had a religious experience. She was desperate, and the colony was low on food. The soy crop was failing. You were too little to remember. It was then she decided that God wanted her to go back to the faith of her childhood, and they don't allow the use of frozen embryos or organ transplants or blood donations."

"Is that why Pia Ahn doesn't like them?"

Daddy had been staring at the wall of the dome, with its rainbow of refracted colors in the setting sunlight. But he turned to look directly at her now, staring hard. "The Council is afraid that if Pia Connor has all her own babies, a lot of other families will switch to her religion so that they don't have to use the embryos, either. Then our colony would lose the genetic diversity it needs to survive."

"I thought it was because they were black." It was a test.

Daddy stood up. "You're grounded, Nyssa. I don't know where you learned that word, but I never want to hear it again." He went back to his spaghetti sauce, stirring in silence.

I learned it from you, Nyssa thought.

Mother came in. "There's a meeting," she said. "Everyone should come. At the schoolhouse."

"What for?" said Father.

"The incident—" Mother began. "The words—" She stopped again. "Just everything."

They left together, with the spaghetti getting cold on the stove. It wasn't fair that Father grounded Nyssa for saying a word that he and mother had used the night before. Nyssa had never been grounded before. She had even envied her friends a little, because being grounded had a grown-up sound to it. But now she resented it.

Finally, she figured that if she was going to be in trouble, she might as well be in a lot of trouble. She rolled out of her hammock and left the spaghetti where it sat, uneaten, on the stove. She glanced left and right as she slipped out the door, her heart pounding, until she realized that Daddy was the only one who knew she was grounded. Then, in the twilight, she ran for the forest.

The forest was made up of giant snakelike treewalls, several meters thick and kilometers long, that wound across the hillside like the whorls of a fingerprint. They wrapped the equatorial zone of the planet in a single, continuous belt. The settlers called it the Labyrinth.

Nyssa had never been inside after dark. As soon as she stepped within the trees, she was enveloped in pitch dark. Behind her, a sliver of gray showed the way back into the settlement. Nyssa waited until her eyes adjusted, trembling.

After a while, she began to see shapes in the darkness. She could see well

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enough to feel her way through the maze. She knew the route by heart, anyway.

Nyssa went quietly and cautiously, expecting to bump into Reese at every turn.

Moonlight washed their secret clearing in shades of gray. Just as she emerged, a minotaur howled. It sounded so near that the hair on the back of her arms stood up.

"Reese?" Nyssa called. There was no answer.

She climbed the fallen tree that led to the fort.

"Why did you come here?" said a voice in the dark.

Nyssa started. It was Reese. She was hidden entirely in shadow.

"Why didn't you answer when I called?"

"I don't know."

"I came to find you," Nyssa said. "Your mother was worried."

"We're leaving the colony," Reese said. "We can live out here, in the forest. My father can hunt. We don't need the rest of you."

"I don't believe you."

"You know why they did it, don't you?" Reese leaned forward and the moonlight fell on her face, lighting up half of it. "They didn't want any more *blacks* in this colony."

Nyssa caught her breath. "That's not a very nice word."

"Well, killing my baby brother wasn't a very nice thing to do, was it?"

"How can you say that?"

"They came to our house almost every week," Reese said. "The *chineys*. Telling my mom that she had enough babies by my dad and she needed to have some from the ship."

"I didn't know that," Nyssa said. "Maybe they were just concerned about the genetic diversity." She closed her eyes and tried to think of the right words. "The founder effect." But she remembered what Mother had said about Pia Ahn's parents and their grocery store.

"You can believe me, or you can believe them," Reese said.

Nyssa couldn't think of an answer for that. Instead, she said, "Reese, you're in trouble because of the words you wrote on the schoolhouse wall."

"I'm in trouble?" Reese said. "What about you? You were there. I didn't make you stay."

"Sometimes you get upset if I don't go along with what you say," said Nyssa.

There was silence for a moment, then suddenly Reese cried out, "Be that way, then! Get out of here." She shoved Nyssa toward the downward-sloping branch that lead to the ground. Nyssa staggered, and caught herself against the main branch. She looked down into the clearing, lit by moonlight, and realized for the first time how very far down it was.

Then Reese reached forward to push her again. Nyssa dodged and Reese overbalanced and lurched to the side, into a dark well created by the treefall. She simply disappeared. Nyssa heard a crash in the branches below. She leaned over, trembling, to look down. She could see nothing but darkness.

"Reese?" she called.

There was no answer.

The schoolhouse was brightly lit from the inside, making the whole dome glow in the darkness. Nyssa ran inside and up against a wall of bodies, all of them turned away from her. "Hey," she shouted. "Someone?"

She tugged at the sleeve of the nearest adult, but he shrugged her off and said, "Shhhh."

Nyssa grabbed the man's arm and yanked, shouting, but he threw her off again, casting an angry glance down at her before he turned away. The room was packed with people, all trying to listen to the meeting. There was a low murmur of voices beneath the speaker's amplified voice. The sounds swallowed up her own small pleas for help. She finally recognized the speaker as her own

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mother.

Nyssa found an empty chair at the back of the room, because everyone was standing up. She climbed up on it and from her perch there she could see Mom standing at the front of the room. The vid screens behind her were filled with numbers and images of blobs with a lot of other blobs inside them. *Cells,* her mother called them.

"I found six different codes associated with each embryo in the computer. After running it through several different decryption programs and cross-checking the information against the physical characteristics of the colony children born from the embryos—"

Pia Ahn stood up suddenly. She and the entire Colony Council were seated in a semicircle behind Mother as she spoke to the crowd. "This is all highly classified information, Pia Christopher," she said.

Nyssa stood up on her tiptoes and craned her neck. Maybe Dad was in the crowd somewhere. He would help her.

Mother ignored her and continued talking. "The physical characteristics matching each code—"

Pia Connor started shouting and trying to drag Mother from the podium. The other Council members stood up to help, and that's when Nyssa noticed that most of them were chiney, like Pia Ahn. When did that happen? She was beginning to understand how Reese had come to dislike chiney. If the council was harassing the family, and was mostly made up of chiney people, it wasn't surprising that Reese had transferred her dislike of the Council to all chiney people.

Nyssa saw Father. She raised a hand, trying to attract his attention.

He didn't see her. Instead, he stood up and punched one of the Council members in the face. Richard, from the Emergency Team, helped him. Two of the Council members grabbed Father from behind, then several members of the audience rushed forward, too. Nyssa couldn't tell what was happening anymore. Her heart pounded with fear. Father was somewhere in the melee!

After several minutes, the brawl subsided. Richard and Father and several people she recognized from the Emergency Team convinced the Council to adjourn and escorted them outside. Pia Ahn stayed behind with Richard holding onto her elbow.

Finally it was quiet again and Mother finished her speech, with Pia Ahn standing disheveled in Richard's grasp.

"The embryos are coded for race and certain other genetic markers. One race code in particular has never turned up in a live baby. I can't say for certain what race is described by the missing code, but I do know what race is missing from the genetic makeup of this colony."

"You can prove none of this!" cried Pia Ahn.

"Furthermore, several women who have been pregnant with naturally conceived babies who also happen to be a part of this missing racial group have experienced unexplained miscarriages. I've examined the medical records carefully and I believe I have evidence that proves those miscarriages were actually abortions, performed by Dr. Oscar at the behest of the Council."

The room exploded with shouts. Pia Ahn's face changed suddenly, contorted, and she began to shout. "You don't know what you've done, Naomi! You would leave the fate of our colony to chance. You would let the *blacks* keep breeding until they flushed out all of our diversity—"

The shouting of the angry crowd drowned the rest of Pia Ahn's ranting. Nyssa couldn't make out anything else she was saying, but she didn't need to. She had to get help for Reese.

She might be dying, or dead already. Nyssa jumped off her chair and tried to push through the crowd. She got thrown back several times before the press of bodies yielded. She was shouting with everyone else, "Help! Please,

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somebody help me!"

Then there was a sudden rush of people leaving the schoolhouse. Nyssa got carried backward with the crowd before she was able to turn around and begin making her way toward her parents. There was Mother, standing bent over at the podium. Father had his arm around her, and Pia Ahn was nowhere to be seen. Richard was squatting on the floor in front of Mom, talking quietly.

Nyssa felt her stomach lurch. Someone had hurt Mother! She remembered the gun that Richard wore at his belt. Had someone brought a gun into the meeting? Was there a shot? Was that why everyone ran away? She couldn't remember.

Then Pia Connor came in and Mother stood up. Her face was flushed, glowing, and she was almost smiling. Her tunic was wet all down the front. Nyssa realized that the baby was coming. Pia Connor, the colony's midwife, led Mother out by the door at the front of the schoolhouse. Father followed her.

Nyssa turned around and went out the back. She could meet them outside and ask for help for Reese. That was when she smelled the smoke. A siren started wailing in the darkness, and she saw Emergency Team members running by in firefighters' gear.

Joey came up beside her. "What's going on?" she asked him.

"The Connor house is on fire," he said. "They got all the kids out, but the house is burning real bad."

"Reese," she said. "I have to get help for Reese."

"Children," said a voice behind them. It was Pia Ahn. "I can help. Come with me." She held out a hand to each of them.

Nyssa was afraid of her, but she was desperate for anyone to help. She and Joey went with her.

Pia Ahn wasn't wearing her shiny blue coat and pantyhose pants. She wore a uniform like the Emergency Team, and a weapon bulged at her waist beneath the jacket. Holding Pia Ahn's hand, Nyssa couldn't take her eyes off the weapon.

She led them to the Lander, which served as a medical and communications facility for the colony. They were in the cockpit, which had padded reclining chairs for two pilots in front of a bank of controls. She had never been inside before. She would have been thrilled any other time.

Pia Ahn didn't give them a chance to try the pilot's chairs or play with the controls. She ushered them into the back. A few adults were there waiting. Nyssa recognized them as members of the Colony Council. Sprawled across the floor and perched on stretchers around the room were children. "Over there," said Pia Ahn.

She turned and ducked out the front hatch again. Nyssa sat down on the cold metal floor. She looked around at the other children. No one was talking. The safe thing to do was to be quiet and wait for instructions.

Nyssa stood up. "I need someone to help me," she said. "Reese is hurt. She fell from a tree in the forest."

One of the women took out a weapon and pointed it at her. "No talking," she said. Nyssa felt her eyes widen. She sat down. Raisa, Reese's younger sister, began to cry and Joey comforted her.

Pia Ahn and another Council member burst in, breathing heavily. "We couldn't get the embryos."

As the adults talked amongst themselves, Nyssa learned that they were planning to leave the colony, taking these two dozen children and as much of the Earth technology as possible. Outside the Lander, there were several storage facilities where frozen embryos and cryogenically preserved animals were kept. The council members used some of the bad words that Nyssa and Reese had written on the schoolroom wall. She felt like she had opened a bag of poisonous snakes and now they would

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never go back in. She wished she had stopped Reese. Or at least that she had thought to blank out the screen before they ran away. Or that she had insisted on going home instead of sneaking into the schoolhouse in the first place. Then none of this would have ever happened.

She ran her fingers between the diamond shapes stamped in the floor, getting them midnight with dust, and tried to figure out how to get away and help Reese.

Pia Ahn went in front and used the radio. When she came back her face was grim. "They want us to give up the children in exchange for the embryos." Some of the other council members protested. Pia Ahn fell into thought, then looked up. "I'm going to tell them that we'll kill the children if they don't give us the embryos."

Nyssa's eyes snapped to the weapon at Pia Ahn's belt.

"They won't believe you!" said one of the Council members.

"Won't they?" said Pia Ahn, giving him a very intense look. "Nyssa, come. You're worthless breeding stock, anyway."

Nyssa went with her to the cockpit. Pia Ahn opened the hatch and pointed her weapon at Nyssa's head. Nyssa couldn't see anything because there were lights shining into her eyes against the darkness. If Pia Ahn killed her, no one would know where to find Reese. "Give us the embryos or we kill the kids," said Pia Ahn.

Nyssa heard people shouting, and there was one scream. Then the noise died down. "We have the embryos. Send the girl out as a sign of good faith," said a clear, deep voice. *Richard!*

"I'll send them out when I have the embryos," Pia Ahn answered.

Inexplicably, Dr. Oscar was standing in the crowd, not in the Lander like Nyssa thought he should be. He was holding an important-looking white box. If he had been taking orders from Pia Ahn, why wasn't he on her side now? Adults were always doing things like that—changing sides. It was hard to keep track of who the bad guys were.

"We can't give up the embryos," Dr. Oscar bellowed back. "The colony will die!" In the lantern light, Nyssa could see his face was red and the veins on his forehead were standing out. Pia Ahn's grip on her arm was like iron.

"So you want to let the children die instead?" said Richard.

Somewhere in the crowd, a woman wailed, "Nooooo!" People started shouting.

"Fools!" cried Dr. Oscar. "These embryos are our only hope of having a future." He shook the box for emphasis, and Nyssa trembled, thinking of the hundreds of thousands of souls inside. Nyssa knew he was right. They couldn't trade all those thousands of children for the handful inside the Lander. She couldn't think of one good reason to give Pia Ahn the embryos. Knowing that Richard and the other adults in the crowd would come to the same terrible conclusion, she began to weep.

A woman pushed her way over to Dr. Oscar and stood next to him. Nyssa recognized her as one of the biologists who worked with her mother. "He's right!" she said. "If we give up these embryos, our colony is doomed. It will be impossible for our grandchildren to find husbands and wives who are not related to them. A few generations after that, founder effect will take hold, and the colony will fail."

"I'm not giving my boy up, no matter what," said a man. "You can take your founder effect and go hang. I care more about having him home safe, now, than whatever happens in a hundred or two hundred years."

The crowd stirred and rumbled in agreement. People began to push Dr. Oscar.

"Enough," shouted Pia Ahn. "You have thirty seconds to make your decision!"

The crowd huddled up around Dr. Os-

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car. She heard Richard's voice rise above the others. "I'll do it," he said, but other voices rose over his, and when the crowd broke apart, it was Dr. Oscar who emerged, still clutching the white box.

Doctor Oscar walked toward the Lander and stopped at the foot of the ramp. He held the box out. "Send out the children!" he ordered.

"Bring me the box," said Pia Ahn.

Dr. Oscar didn't move. "Send the children out, and I'll put it down on the ramp."

Pia waved her weapon at Dr. Oscar. "Bring it inside," she said. "I won't warn you again."

Dr. Oscar laughed. "How do I know you won't slam the door and keep everything?"

All was silent for a moment. Pia Ahn was breathing heavily.

Nyssa looked up at the forest and caught a glint of metal. Her breath caught, and she realized what the Emergency Team was trying to do.

"You'll have to trust me," said Pia Ahn.

"You know I can't do that," said Dr. Oscar. He took a step up the ramp.

"Stop!" shouted Pia Ahn, her eyes wild.

"I thought you wanted me to bring it inside."

"Throw it!" said Pia Ahn. "Toss it to me."

"You still haven't released the children."

Pia Ahn clutched Nyssa close to her and moved down the ramp, taking tiny steps. Nyssa trembled. She could feel the unseen sniper looking at her through his sights, moving his crosshairs up and down, looking for a gap between her and Pia Ahn. What if he didn't find it? Would he shoot anyway? The whole colony was at risk. What was one crippled child? *Shoot*, she thought as hard as she could. *Do it!* But it didn't happen.

Pia Ahn and Nyssa reached the bottom of the platform. "Now give it to the child," she ordered.

Dr. Oscar's eyes went wide. He turned and looked at the forest, up into the trees, then he turned around. There was an expression of fierce abandon on his face as he reached for his hip. Pia Ahn shot him and he dropped where he stood, the white box falling to the ground. Pia Ahn pushed Nyssa forward, still keeping close. *Do it*, Nyssa begged, but still there came no shot. Desperate, Nyssa decided if anything was to be done at all, she would have to be the one to do it.

First, Nyssa collapsed, letting her muscles go slack, and simply fell down at Pia Ahn's feet. Pia Ahn flailed around, grabbing for Nyssa. It was over in an instant, but that instant stretched to eternity. Pia Ahn fell, blood blossoming from her chest. Even as she fell, she lurched toward the box of embryos where they lay in Dr. Oscar's arms, so that she died on top of him.

Then the ramp began to lift. Someone was closing the Lander. Nyssa rolled over. She had just enough time to jump, but a better idea occurred to her. She watched the side of the hatch as the Lander lifted her up closer to it. Then, when the time was right, she lifted up her prosthetic leg and wedged it between the door and the doorframe, so that it wouldn't close. The leg was many times stronger than human flesh and bone, and would not break under the pressure. What she hadn't planned on, though, was the pressure on her very human hip. The pain lanced through her, making her scream, but she pushed with the leg, fighting the hydraulics that were levering the door closed.

It only took the Emergency Team members a minute to regroup and rush the Lander through the half-open hatch. Then Nyssa felt something give in her hip, heard a crack, and fainted.

Nyssa swung herself up onto the tree branch to find Reese waiting for her. Her hip was still stiff, months after it was

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broken on the Lander door, and her new leg was strong, but awkward. She found she could make it all the way up the tree by herself, now, rather than relying on Reese for help.

Reese smiled at Nyssa. "How's my baby?" she said. She was talking about Nyssa's baby brother Luther. He had been born the night everything had happened, and the whole family had fallen in love with his big brown eyes right away, along with his golden skin and midnight hair. Already, he was starting to sit up and babble baby nonsense.

"Mom gave him some banana today. He spit it right out," said Nyssa.

Reese beamed. She was among Luther's greatest admirers. After the accident, as soon as Nyssa recovered from her fracture, and Reese from her head injury, the girls had been pressed into a heavy load of chores, much of it babysitting. Apparently the colony thought what they needed was more responsibility—much more. When they weren't tending younger siblings, they were often in the colony nursery, caring for other children. And when they could avoid nursery duty, it was hard labor out in the fields, tilling and planting for the season's new crops. This was, in fact, the first chance they'd found to meet at their old hideout, and there were clear signs that Raisa and some of the other young ones had taken it over.

Nyssa took a deep breath and closed her eyes. The noise of the forest rose up to fill the silence. "We need to get out here more," said Nyssa.

"I know," said Reese. "I guess I hadn't felt like it since . . ."

"Yeah, me neither," said Nyssa. "But now I'm here, I'm glad."

"What do you think would have happened if Pia Ahn got the embryos?"

"And all those kids?" said Reese. "It would have been the end of everything."

"Do you think it was our fault?" said Nyssa.

Reese shrugged. "Everyone said that it was coming a long time before, but I wish we hadn't been the ones to start it."

"Me, too," said Nyssa. She had known it was a bad idea to sneak into the schoolhouse, but she hadn't stopped Reese. It was hard to see her own part in it at the time. But now she knew that she could have stopped Reese. That maybe Reese was even counting on her in some way not to let it go too far.

"I want to show you something," Reese said. She opened her hand and there were three skinny green rolls in it—Tabulan cigarettes.

Nyssa sighed. "Reese . . ." she said.

"Let's just try them," Reese said. She took out a lighter.

"No," said Nyssa.

"What?"

"Reese. Grow up."

There was a long silence as Reese stared back at her. Her expression morphed slowly from hurt to anger to confusion then started over again. Nyssa's chest tightened with the old fear that she would lose her only friend.

Then Reese suddenly threw the cigarettes at Nyssa. "You grow up!" she cried, laughing.

Nyssa realized Reese's eleventh Tabulan birthday was coming in just one week. That would make her a bit over thirteen back on Earth. But on Earth, a thirteen-year-old was a child. On Tabula, it was the legal age of adulthood. Reese would be eligible to vote, free to marry and start a family of her own, choose a trade and apprentice in it. And a few months after that, Nyssa would celebrate her own eleventh birthday. It was absurd. They were too young to be grown up. But it was happening anyway. Nyssa grabbed a handful of leaves and stuffed it down Reese's shirt, and the two girls wrestled, rolling precariously on the wide branch, twenty meters above the ground, knowing that they wouldn't be coming back. ■

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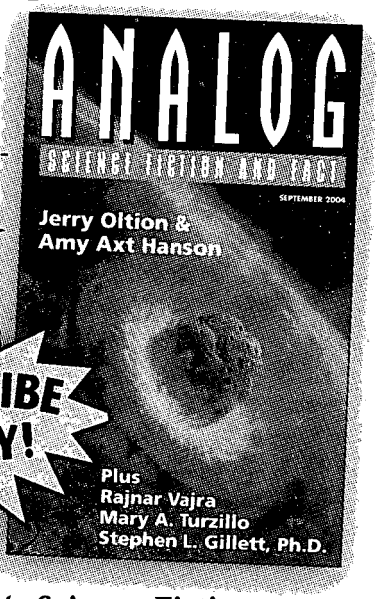

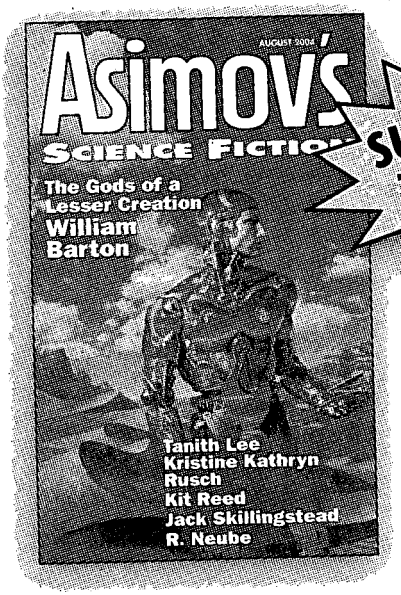

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The Slow Train

Don Sakers

Illustration by Broeck Steadman

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Susan Shetland awoke to the far-off call of a train whistle.

She smiled, lingering in the wake of pleasant dreams, then gave a languid stretch and glanced at the clock. Half past seven. Time to get up.

Susan gave her sleeping husband a final glance, then made her way downstairs for breakfast. It was a typically chilly English morning, and the wind had a tendency to whistle right through the walls and windows of Uncle George's old house.

The stout housekeeper was reading a romance paperback by the fire when Susan descended the steep, creaky stairs. "No, don't get up, Emma. You look so comfortable. I'll make my own breakfast."

"Bless you, dear, but it's no bother." The older woman steered Susan to the table. "You just sit down right here and have a cuppa to take the chill off." Steaming tea appeared as if by magic. "I'll be right back with some warm oatmeal and some eggs for you, just as you like them."

Stirring her tea, Susan sighed. Uncle George was so seldom home that the poor old woman was alone in the house most of the time; Emma had told Susan that she had thoroughly enjoyed these two weeks with, as she put it, "someone to care for again."

She sipped, allowing the tea and the fire to warm her.

Two weeks. And it had been marvelous. She'd been away from England for far too long, and when Uncle George had offered them plane tickets and a month's use of his country house, she'd jumped at the chance.

Maybe that was my mistake, she thought. I should have asked Bob before I accepted. But who would have thought that he'd have any objections to a free month in Britain?

Not that his objections had been sensible, any of them. Neither of them had any trouble scheduling vacation time from work, and it was easy enough for his parents to take care of the apartment while they were gone. He seemed to be against the holiday, simply for the sole reason that she wanted it.

She drained her cup and poured another from the ancient teapot beneath its quilted cozy. Lately, Bob had been objecting to too many things, and all for the same lack of reasons. If she said it was night, he would insist that the sun was up.

Well, damned if she was going to let his foul moods affect her good time! She had lived without him for—

The front door opened, and Uncle George stepped in. And Susan felt her heart lift as if she was a little girl again and he was arriving unannounced at the family's tiny flat with an armload of gifts and treats.

"Glory be, the master's home," cried Emma, racing for the chubby, silver-haired gentleman in his ridiculous pseudo-Victorian suit and coat. George Merrick lifted her for a moment by the elbows, then spun her around and deposited her again on the floor.

"Lord, but it's good to be welcomed to a nice warm home on a day like this," he said in a resonant baritone. "Emma, get some hot food on that table, and keep it coming! Susan, love, come here and say hello to your uncle."

Laughing, Susan threw her arms around him and gave him a quick peck on the cheek. "I didn't know you were coming. I'd have made sure everything was ready."

"Not to worry. Business, don't you know? I'd have been here two days ago if it weren't for business." His eyes lighted on the table. "Is that tea I see? I've spent half the night driving from London, my toes are frozen." Shedding his outerwear, he marched to the table and plopped in a chair. Susan poured for him, then took up her own cup.

"We've been having a tremendous time here, Uncle. I can't thank you enough for letting us use the place."

Chuckling, he waved her thanks

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aside. "Not at all, not at all. This poor old house sits lonely most of the time, but can't bear to part with it. Been in the family forever, you know. Wish you two could come live here year-round."

Stunned, Susan gave a nervous chuckle. "So do I!" Was he serious? Would he really turn the place over to her and Bob, just like that? She'd known that Uncle George was rich, but she'd had no idea . . .

Emma came in with a heaping plate of eggs, bacon, steaming oatmeal, and the curiously English brown-on-one-side toast. "There's more where this came from," she said as she set the plate in front of George.

Susan helped herself to a portion about twice the size of her usual breakfast—when she got home, she was going to have to do some serious dieting—then watched in amazement as Uncle George proceeded to finish off the rest of the ample platter. Working like a power digger, he kept shoveling it in; and all the while he kept up a fast-running conversation with both Susan and Emma. How on Earth did he manage it?

When at last the plates were clean and the last of the tea poured, Susan leaned back and regarded the old man over the rim of her cup. "Uncle, you didn't spend the night driving from London just to see Bob and me. Something else brought you out here."

His feigned expression of surprise melted into a smile. "I could never fool you, even when you were a little girl." He glanced at the window, where rosy dawnlight spilling through lace curtains made intricate spiderwebs of light on the wall. "My dear, how would you like to go for a drive?"

Susan hesitated only an instant, thinking of Bob still asleep upstairs. Then she pushed her chair back from the table and stood, forcing him out of her mind. "I'd love to."

Uncle George's Rolls was one of the new electric models; it purred silently as he guided it down the lane, into the village, and around the roundabout with the unconscious skill of a native. Susan, used to driving American highways in her perky little diesel Rabbit, was still cautious about English roads . . . and absolutely terrified of the roundabout.

Soon, though, they were beyond the village and out on open road. Morning mist lay low on the countryside as if daring the sun to do something about it. Susan leaned back in her seat with a contented sigh. Before she moved to the States, she and Uncle George had often gone on impromptu trips like this, driving from one end of Dorset to the other in search of Thomas Hardy's great-grandfather's cottage, the village that Viscount Milton moved, or the exact spot where Louisa Musgrove fell.

She'd tried to interest Bob in making such an excursion during this vacation, but he was far too intent upon watching English television and seeing the usual tourist sights: Stonehenge, Stratford, Bath. In the end she gave up, settling instead for long strolls alone through the surrounding countryside, or evenings at the local pub with the townsfolk.

She and Bob had been growing apart for quite a while now. At first she'd made efforts to close the gap; but as years went on, the attempt was not worth the effort. Bob wanted to make money; his career and his bank account were the most important things in his life. Sometimes Susan wished she could win the lottery; she would give Bob all the money so that the two of them could get on with their lives.

She had to give him credit: at least he had come along to England. Perhaps he wanted to heal the rift as much as she did . . . but neither of them knew the way.

Whistling, Uncle George drove the car onward, following its shadow up one hill and down another toward the West Country. Susan started; had she fallen asleep? The sun seemed higher,

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the morning less chilly. "Where are we going, Uncle?"

He grinned. "You'll see when we get there." For a moment he was silent, then he said, "Tell me, have you lost your fascination with trains?"

"Oh, no!" she blurted at once. "Of course, there's not much opportunity for trainspotting in the States." And with work, she added to herself, and the apartment, and Bob, she hadn't had a chance to ride a train for . . . years. Bob didn't like the train; he said it was too slow. Their few long trips had been by plane. "It's been too long."

He smiled. "Good, then. You're in for a treat."

"We're going to see a train?"

A chuckle. "You'll know when we get there. No more questions, now."

When Uncle George said "no more questions," he meant no more questions. He was intent upon a surprise, and she would have to wait for it. She turned her attention back to the unfolding landscape outside, and to watching the road signs.

Faded and rusted, overgrown with hardy weeds, or standing slightly askew on posts of dark, weathered wood, the signs called to her with names of nearby villages and towns: Milton Abbas, Ansty Cross, Corscombe, Netherbury, Monkton Wyld, and a dozen others, each more evocative than the last. Nowhere else in the world, she thought, would you find place names such as the English had. She loved each and every one of them.

The car topped another hill and headed downward. Spread out before her was a broad valley of such lush green that it nearly made Susan gasp at the sight. A narrow stream flowed through the valley, and a cluster of tumbledown buildings in the middle distance neatly straddled the water. Uncle George slowed the car, and Susan knew that their destination was ahead.

"Where are we?" she asked.

"That's Coombe-on-Axe," he answered, gesturing at the village. "I would be surprised if anyone lives here now, but in its day it was quite a pleasant town." He glanced her way with a smile. "I understand that the pub had the friendliest landlord and heartiest beer in West Dorset."

Susan chuckled. "Both would have to be outstanding to beat The Queen's Carriage."

"What a pity the establishment is no longer in business, so we can't compare." Two or three miles outside the town, the paved road suddenly became a dirt track. Uncle George eased the car to the side and shut off the engine. "I'm afraid we'll have to walk the rest of the way. I hope you don't mind."

"When did I ever mind walking with you?"

Susan stepped out into the sunlight and stretched. She took a deep breath; the air was clean, fresh, and cool, and it carried the barely-perceptible scent of honeysuckle. She thought she could hear the distant rush of the stream.

Opening the trunk, Uncle George assembled a two-wheeled luggage cart and piled a few battered leather suitcases upon it. Then he took the handle and started toward the town. "Come along."

Susan took the cart from him. "Are you going somewhere?"

"All in good time, dear. For the moment, let's enjoy the stroll."

Enjoy it she did. Although Uncle George glanced at his watch once or twice, he did not seem to be in any particular hurry, and the dirt lane was a pleasant succession of one magnificent view after another. Susan lost track of time, but she supposed they had strolled a good half hour before they came into town.

If anyone did still live here, Susan didn't know where they might be; the houses and shops were boarded up and their lawns choked with ivy, tall grass, and a few brave saplings. Even the street was impassable with fallen branches, great potholes, and one puddle so huge

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that she thought it could better be called a pond. Nobody, Susan suspected, had been here for two dozen years . . . at least.

Still, Uncle George led the way as if he knew where he was going. They walked down a slow incline toward the stream, then turned onto a side street and away from the village. Before the houses came to an end, though, the ruin of a train station appeared around a bend.

If the town had seen better days, Susan thought, then the station had forgotten them. It was a long, low building whose crimson brick was dark with the dirt and dust of a hundred years. A corner of the roof was caved in, and a large oak tree grew right through the back wall.

The tracks beyond were rusted and all but lost in tall yellow grass. No train had been by here, probably, in her lifetime. Susan looked a quizzical smile at her uncle. "I hope we're not waiting for the local, because it's going to be a long wait."

He glanced at his watch and then slipped it back into his vest. "Another half hour, if that. Not that long at all." Then he stepped around the corner out of her sight.

This was so like him, she thought. Yet she couldn't be annoyed. He was preparing to spring some surprise, and knowing him it would be something wonderful. Braced for a start, she turned the corner and gasped.

The front of the station was as tumbledown as the back: the wooden platform was half collapsed, half overgrown with ivy, decades of rain had washed a gully beneath the tracks, and the once-shingled roof gaped open to admit the morning sun.

And standing amid all this ruin was a Victorian tea party that would have done Lewis Carroll proud.

Nearly two dozen men and women stood on the slanting platform, all dressed in the finery of a bygone day. The men wore top hats and high collars, the women bustles and vast expanses of crinoline. A few small children in T-shirts and jeans seemed completely out of place. A railway luggage cart, piled high with trunks and suitcases, sat next to the tracks beyond the platform.

Most of the people were elderly, but a few couples (the ones who belonged to the children?) seemed to be roughly Susan's age. All, no matter what their age, stood with eyes fixed on the tracks—exactly, Susan thought with rising unease, as if they were waiting for a train.

"Uncle George—"

A nearby man turned in her direction, smiled, and extended a hand to Uncle George. "George! Good to see you, old man. Wondered if you would make it this time."

"Hello, Harry. Wouldn't miss it for the world, you know." He gestured to Susan. "Miss Shetland, my . . . niece. Susan, this is Harry Templeton." Uncle George rocked back on his heels for a moment. "Quite a gathering. Larger than last time."

"Oh, you missed Sherborne in '53. Must have been half a hundred of them. An' a good six-and-twenty boarded that day. Don't suppose we'll see another like that."

"Not for a long while."

"That's for sure." Harry Templeton narrowed his eyes. "You're boarding today, George?"

"Aye."

"And your . . . niece?" He nodded toward Susan.

"She . . . er . . . hasn't made up her mind yet." Uncle George tipped his hat. "Have to go put my bags on the stack, Harry. Talk to you later."

"Of course. Once we're aboard."

Susan tried not to stare dumbly as Uncle George took her hand and pulled her toward the luggage cart. The others seemed to be ignoring them as she lifted his small bags onto the heap already there.

"Uncle, what's going on here? It's some kind of anniversary, I can tell that . . . but anniversary of what?" What

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could possibly bring all these people—in costume—out here into the middle of nowhere to stand on a deserted train platform (with their luggage, no less) and pretend that a train was coming down rails that had not seen an engine for thirty years or more?

"Child," Uncle George began softly, "I don't quite know how to tell you all this. To begin with, I'm not your great-uncle as you believe."

Best, she decided, to humor him. "All right, then, who are you?"

"If I've counted right—and I think I have—then I'm your great-great-grandfather."

Before she could react, before she could even think to be shocked or to laugh or to fall down screaming into a puddle on the ground, Susan heard a sound that cut through the still morning air and shot directly into her heart, paralyzing her. It was a sound that couldn't possibly be, yet it was so close and so loud that she knew she could not be mistaken.

Clear and strong, an approaching train whistle split the air.

Susan had never fainted before, had never known anyone who fainted. Consequently, she was surprised to find herself on the ground, looking up at a circle of half a dozen concerned faces.

She struggled to sit up, and found Uncle George's strong arms supporting her. He looked a little sheepish. "Susan, my dear, I am so sorry. I should have told you earlier."

She sat up. "I-I think I'm all right." The others stepped away, politely giving Susan and her uncle a measure of privacy. "Unc—" She stopped, then started again, "George, you can't be my great-great grandfather. That would make you over a hundred years old."

"One hundred eighty-six last April, to be precise." His look of distress grew more acute. "Oh, dear, I'm doing this so badly."

"What's going on here? What was that whistle? There can't really be a train coming . . . can there?"

"Take a look."

She looked down the tracks, and for a moment she saw nothing. But no . . . there it was. The barest outline, only just visible over trees and distant hills, like the first instant of image in a Polaroid photograph: an old-time steam locomotive drawing an indistinct column of passenger cars. Susan blinked, and it was gone; blinked again, and she was surprised she could miss it. Motionless, the engine very definitely loomed as if it had been frozen in the process of steaming into the station.

A plump, kind-faced woman stepped over and crouched next to Susan and offered her a paper cup. "Here, dear, I thought you might want some water. It's something of a shock, isn't it?"

"Thank you." She drank thirstily. "Frankly, I don't have the slightest idea what's going on."

The woman frowned at George. "Never knew a man to do a good job of explaining anything," she said. "Here, let me help you up." One broad arm levered Susan to her feet. "I am Mrs. Gladstone; you must call me Maggie."

"Susan."

"Please to meet you, Susan. Oh, let me see if I can clear up your confusion. George, what have you told her so far?"

Uncle George seemed a little put out. "Only that I'm her great-great grandfather. I was doing fine until—"

"Pish-tosh. Susan, have you ever heard of the Slow Train?"

"You mean the milk train?"

Maggie smiled. "No, not quite. I don't suppose you've read Mr. H.G. Wells' *When the Sleeper Wakes?*"

"I read *War of the Worlds* in high school."

"No, I'm afraid . . . ah, well, certainly you've heard of Rip Van Winkle?"

"Of course."

"In Mr. Irving's story, Mr. Winkle fell asleep for a hundred years. The Slow Train . . . well, the Slow Train does the

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same thing. It left London in the 1830s, and it's been chugging along ever since then at about a mile a year. Of course, on board time moves much more slowly. One minute on the Slow Train is nearly two months on the outside."

Susan shook her head. "That's incredible." She glanced down the tracks, uneasily aware that the ghostly engine was rather more distinct than it had been only a minute ago. "Impossible. We can't even do something like that today—in 1830 they couldn't have . . ."

Maggie nodded, patting Susan's hand. "I can't pretend to understand Professor Möbius' mathematics. I don't think anyone can understand his theories. And his marvelous Time Distortion Engine is certainly the most complicated machine I've ever seen. All I know is that it *does* work."

The woman was so earnest, Susan found herself starting to believe. She looked at George. "Were you aboard when the train started?"

He nodded, a faraway look in his eye. "I had lost my wife two years before. My sons were moved out; there was nothing to hold me." He sighed. "When the train stopped at Milton-on-Stour in 1928, I hopped off to see the wonderful world of the future. I'd left a few investments, which had grown in the last century, and I was able to set myself up a good business. Originally, I only intended to stay until the next scheduled stop in 1953—but in the interim, I found my family."

"Mother . . ."

"Yes. Your mother was my great-granddaughter; the last child of my line. I introduced myself to her as a long-lost uncle. She and your father took me into their hearts and made me feel quite at home." He shrugged. "When you were born, I knew I couldn't bear to leave you until you were grown." He looked away. "I wish your mother and father had lived to see you as you are now. They would be so proud."

"Mother always thought you were the greatest," Susan said. Oh, that sounded so inadequate. "So did I."

George smiled. "Thank you. She always made me feel like I belonged. When the Slow Train stopped again in 1975 I attended in order to see old friends I hadn't spoken with for almost fifty years. But I wasn't at all tempted to re-board."

"I'm glad you didn't." Susan glanced at the train, which by now was a definite presence. She could no longer see the sky through its black iron bulk. "And today . . . ?"

He shrugged. "I'm an old man. And the next scheduled stop is more than twenty years from now. I'll never make it."

"Are there ever . . . unscheduled stops?"

Maggie answered instantly, "Just once. During the Second World War. We all thought the world was coming to an end. But Mr. Bergenfeld—he's our engineer—got the train running again."

"Then . . ." Susan took George's hand. "Then you'll be going."

He nodded. "The train will stay in this station for about an hour. After that it's 'All aboard!' and goodbye to this world for twenty years."

The whistle sounded again, this time louder and more exuberant. Maggie smiled. "Andrew—Mr. Bergenfeld—has an extra-high-frequency whistle that sounds just fine in the outside world. He loves to blow it." She looked off into the distance. "Sometimes along the Slow Train's route, you'll hear that whistle when it looks like there's no train around for miles."

Before Susan could answer, or even think what to say, there was a tremendous roar coupled with a frantic, earsplitting hiss. The train, which so far had been nearly motionless, lurched forward, erupting into complete solidity. The air was filled with the screech of brakes and billowing clouds of white steam. All heads turned, all eyes captive of the tremendous spectacle. Belching

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steam and spitting fire, the giant black behemoth screeched to a stop with an effort that shook the entire station.

The Slow Train had arrived.

Susan moved as if in a dream. Maybe she *was* dreaming, she thought. Maybe she still slept in the big bed in Uncle George's house, huddled away from Bob and the cold and just dreaming of the Slow Train.

If so, she wasn't sure she wanted to awaken.

George helped her onto the train with an oddly archaic grace, a Victorian gentleman giving his arm to a lady. Then he introduced her to the engineer, and gave her a tour of the Slow Train.

It all looked like something out of Jules Verne or Sherlock Holmes: the elegant dining car with its starched tablecloths and fresh-cut flowers, the plush upholstery of the passenger coaches, the smart, pseudo-military uniforms of the porters and conductor. And the people—young and old, male and female, highborn and commoner—all were smiling, relaxed, with none of the stiff formality she associated with their time period.

There must have been nearly two hundred people aboard the train's five cars . . . and plenty of room for more. Many, apparently, had boarded since the journey began. One elderly man introduced her to his grandparents, who were easily half his age; another family boasted four consecutive generations aboard the train. In the smoking car Susan saw a poker game in progress between two great-grandfathers and their great-grandsons . . . all of whom were apparently the same age.

Professor Möbius' Time Distortion Engine, which occupied most of a luggage car directly behind the tender, was indeed a marvelous and complicated device. It was all composed of shining brass and copper tubing, massive spinning magnets, miles of tightly-wound wire, and blown glass structures twisted into odd shapes that did not seem to belong in the world at all. A deep purple glow played over the entire machine, and every few seconds electrical sparks danced along its surface. Being near the Time Distortion Engine gave Susan an odd feeling of discomfort in her stomach, as if she were on a roller coaster.

She wished Bob could be here to see it.

The Slow Train, Susan learned, was not bereft of modern technology—or of knowledge of the outside world. They'd had radio, George told her, since the 1920s: some tinkerers had built a device that slowed down selected transmissions to match the train's slow time. Newcomers and those reboarding after an absence always brought along the latest books, magazines, and newspapers. A battered black and white television set, its chassis and tubes wired into the train's electrical system, sputtered to itself at the rear of the smoking car; she imagined men huddled around it, catching quick glimpses of images from a world beyond their dreams.

"Harry tells me he's brought aboard a DVD player and a selection of movies," George told her. "I expect there will be great debate over what to watch first: *Casablanca* or *Star Wars*."

They told her that they were heading for Cornwall: the end of the line was Land's End, and if Andrew kept them on schedule as he had so far, they expected to arrive near the end of the twenty-third century.

"And what will you do then?" she asked.

Maggie answered with a laugh. "Why, turn around and come back! What else?"

In the end, the allotted hour went far too quickly, and Susan found herself on the train's rear platform unable to let go of George's hand. The luggage was all loaded, the tender had been replenished with wood from the tumble down station, and the conductor was making a final walk back from the engine to the train's tail.

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"Gr—George," she said, "it's been wonderful. I'm sorry I doubted you. I don't know how to thank you for letting me see this."

His eyes met hers. "Susan . . . you're welcome to come along."

Her throat closed, and a sudden lump appeared in her chest. "I couldn't." Could she?

"It's your decision, my dear. I gather that you aren't as happy with Bob as you could be?"

"No, that's true." She looked out over the forgotten town of Coombe-on-Axe, tried to imagine going back to Bob, back to Baltimore, back to her job and her tiny apartment. Back to the arguments, the stress, the endless frustrations of modern life.

Why, when she could stay here and pass that life completely by?

George squeezed her hand. "It's your choice," he repeated. "I took the Slow Train to escape . . . and sometimes I wonder if I did the right thing." He smiled. "Then again, if I hadn't I would never have known the joys of my family, and of seeing my little girl grow up."

The conductor reached the end of the station's listing platform. His shout echoed in the still afternoon: "All aboard!"

I want to stay, Susan thought helplessly. It would be so easy; she didn't even have to move. The difficult choice was to leave; to jump off the train and let it go chugging away into the future. Three metal steps stood between her and the real world, but those three steps might just as well have been a yawning chasm.

Bob wouldn't miss her, at least not for long.

The conductor swung a flag and sang out again, "All abooooard!"

As if struck by an electric shock, Susan moved suddenly, bent to kiss George on the cheek, and took a single step down. "Thank you, George, but I can't. I . . . I can't run away, not now. Not yet." Not until I've tried everything, not until I'm sure it won't work.

George nodded. "Good girl."

The train lurched and the conductor jumped aboard, tipping his hat to Susan. "All aboard, miss," he said sweetly.

Susan moved down a step, then another. One more step would take her off the train.

George reached into his suit jacket and thrust a large envelope at her. "Take these papers. I've put everything—the business, the houses, the cars—all in your name."

The train started moving; a faltering, lurching movement as if the train itself were reluctant to leave. Susan squeezed George's hand for the last time. "Thank you. I don't know what to say."

He let go. "How about 'See you soon?' Our next stop is Dunkeswell. I put the schedule in that packet."

She jumped off the last step, feeling a tingle as she landed on the stony ground. She heard the conductor call out destinations, in the fashion of conductors throughout history, "Dunkeswell, Butterleigh, Morchard Bishop, Taw Green . . ."

The train pulled ahead, gathering speed as it moved away . . . two feet, then three, four, five . . .

"Susan!" George shouted. His voice was frantic. "Here, I almost forgot. Take this." Hanging on to the railing, he held another envelope out to her.

". . . Highampton, St. Giles on the Heath, Upton Cross . . ."

She ran to the train, grabbed at the envelope, and felt gravel shift. Her feet went out from underneath her. She fell to her knees and watched as the train surged ahead as if finally catching its breath.

Then, suddenly, there was a ripple in the air, and the train seemed to freeze, to grow slightly transparent even as it was moving away. There stood George, now a statue with his arm extended in farewell. There stood the conductor, his words still echoing the train's path well into the next century: ". . . Cardinham, Hensbarrow Downs, Carland Cross,

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Three Burrows . . ."

In the sudden silence she was alone, except for a ghostly image on the tracks and a single envelope fluttering to a soft landing in the tall grass.

Just for the joy of the laughing, she laughed.

Standing gingerly on skinned knees, she picked up the envelope. It was creased and worn, and her name was scrawled across it in faded fountain pen. Whatever it was, George had been carrying it for years.

She tore it open and laughed all the harder when she saw the two stubby pieces of cardboard inside. They were, she knew, purely symbolic—but they were a gift more precious than all his bank accounts and houses and cars put together.

A pair of tickets, destination unspecified, for a ride on the one and only Slow Train.

Tucking the tickets in her pocket with the rest of the papers, she turned with a smile to the unhurried walk back to the car. Behind her, she heard the phantom voice of a train whistle echo from the hills. ■

IN TIMES TO COME

Our November issue features two quite different and highly imaginative novelettes, one by Rajnar Vajra (which could be construed as another "Halloween" story, though it's nothing at all like the one in this issue) and one by Kristine Kathryn Rusch (about an utterly new and uniquely disreputable profession). We'll also have a wide variety of other stories by such writers as Mike Moscoe and Robert Scherrer.

Richard A. Lovett's fact article, wearing the somewhat improbable title "Fat Mice, Eating Machines, and Biochemical Treason," takes a frequently surprising look at the science behind one of our culture's perennial obsessions: human weight and what might be done to control it. And, of course, we'll have the conclusion of Mary A. Turzillo's novel *An Old-Fashioned Martian Girl*

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Whispers

by

Carol Johnson Fyfe

Whispers in the winds of time
It's not the silence here challenging our sanity.
Instead, shapes created from stars tear us back to Earth
Where our imaginations found meanings in clouds.
Whispers in the wind of time
The grass shade of green painted on a wall or
A fresh rose scent somehow dominating recycled air
Pings of dust on a hull mimicking rain on tin roofs.
Whispers of scent and sight evoke sensual variety
Create a planet in this lonely ship.

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LEFT-HANDED MATERIALS—SUPER-RESOLUTION OPTICS?

New "left-handed" composite metamaterials are an amazing new development in optics, creating materials that have "backwards" optical properties and promise resolution sharpness that had been thought impossible. In this column we'll consider this potential revolution in optics.

One of Nature's miracles is the existence of optically transparent materials. Light, whether in the form of gamma rays, visible light, or radio waves, is essentially an electric field in motion. That electric field always interacts strongly with the electrons in orbit around atoms, violently shaking and dislodging them and dumping energy in the process. Because of such interactions, we would naively expect that dense matter should be opaque to the passage of light, that it should be utterly black and completely absorbing. And yet we have transparent materials like water and glass, liquid and solid forms of matter through which visible light can pass almost as if the material was not there.

This amazing behavior occurs because the tightly bound outer electrons of transparent materials are vibrated in unison by the incoming light waves, so that they form a chorus line that catches and passes along the energy of light to the next line of electrons along the path. Energy is transferred, bucket brigade fashion, by the electrons moving precisely in unison. This process is called "coherence," and it is a very important phenomenon in optics.

One consequence of coherence in transparent materials is that the phase velocity of light waves—the speed at which wave crests move through the material—differs from c, the velocity of light in free space. In water, the speed of light drops to about 75% of c. In some glass used for lenses, the speed of light may be reduced to as low as 58% of c, and in diamond, the speed of light goes down to 41% of c. For historical reasons, this slow-down in light speed is represented in a rather confusing "upside down" way, using the index of refraction n, which is the speed of light in free space divided by the speed of light in the material. The larger the value of n, the slower the speed of light in the material. For example, the index of refraction is n = 1.33 for water, 1.75 for flint glass, and 2.42 for diamond.

Light waves in passing through the surface of a transparent material obey a rule called Snell's Law, which requires that the index of refraction n times the sine of the angle the light makes with the direction perpendicular to the surface must be the same on both sides of the surface. In other words, when light enters a transparent material through a surface and slows down, it bends to travel closer to the perpendicular to that surface. Lens makers exploit this behavior by forming curved lenses that progressively tilt the surface to focus or defocus beams of light. A lens is constructed so that the light rays passing through the lens farthest from the lens center encounter the most tilted surface and receive the strongest deflection.

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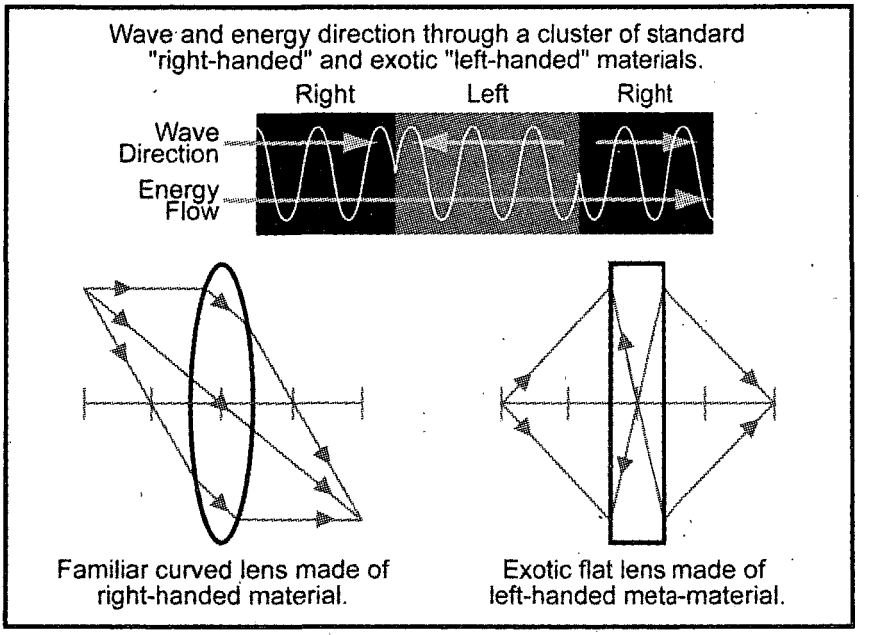
Wave and energy direction through a cluster of standard "right-handed" and exotic "left-handed" materials.
Right
Left
Right
Wave Direction
Energy Flow
Familiar curved lens made of right-handed material.
Exotic flat lens made of left-handed meta-material.

Illustration by Wolf Read

This makes it possible for rays diverging from some object to be brought to a focus and to form an image of the object.

However, the wave nature of light and the limited aperture of the lens result in a limit on how sharp the image of an object can be. This limit, called the Rayleigh criterion, is proportional to the wavelength of the light being focused divided by the lens aperture. In part, it arises because an exotic form of light wave generated at the interface, called an "evanescent" wave, is lost in passing through the glass of a lens, with a consequent loss of information and a slight spoiling of image sharpness. This has been considered to be an unbreakable limit on the resolution of optical instruments. However, as we shall see, it appears that left-handed materials may provide an "end run" around the Rayleigh criterion, leading to improved resolution.

A light wave is formed by the simultaneous oscillations of an electric field and a magnetic field. In transparent materials, the electric field has all the interactions, while its companion magnetic field essentially "goes along for the ride" and is left pretty much alone by materials it encounters. Only when we focus on the direction of motion of the wave (or its "light pressure") does the magnetic field need to be examined. The electric and magnetic fields are always perpendicular, and the light wave moves perpendicular to both of them. You can use the so-called "right-hand rule" to tell which way the light wave will move. Let the fingers of your right hand curl from the electric field direction to the magnetic field direction. If you do this, the thumb of your right hand will be pointing in the direction that the light wave moves.

The new optics development is an artificially constructed "left-handed" material, a man-made meta-material that modifies the electric and magnetic fields of incoming light waves so that the index of refraction of the material becomes *negative* and the phase velocity of light in the material is a negative number. At

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the moment, this trick is not applied to visible light, but rather to high-frequency radio waves in the gigahertz region where the implementation is easier.

The trick is to construct a meta-material composed of a three-dimensional array of tiny repeating clusters of small antenna bars, wires, conducting loops, and/or C-rings, so that each cluster of such elements is smaller than the wavelength of the light with which it is interacting. For microwaves, this means that the array can have a cluster size of a few millimeters, which is well within the capabilities of modern micro-fabrication techniques. The elements of the meta-material are designed to modify both the electric and the magnetic fields of the incoming waves so that the overall electric permittivity ε and magnetic permeability μ are negative, and therefore are unlike the values of these constants in any known natural material. The result is that the index of refraction n is also a negative number. This means that the wave crests of the light waves in the material move in the opposite direction from the energy flow direction. The energy goes forward but the wave crests move backwards. The name "left-handed materials" comes from the fact that one would need to use a left-hand rule (rather than the right-hand rule) to determine the wave direction from the electric and magnetic fields.

For optical applications, the negative index of refraction of left-handed materials has two interesting consequences. First, because of Snell's Law, it means that the angle that an incoming ray makes with the interface will become a negative angle on passing through the surface, so that a diverging ray becomes a converging ray. Therefore, a simple flat surface of a left-handed material constitutes a converging lens. The other consequence is that the evanescent waves generated at the interface grow in strength in passing through the left-handed material rather than dying off. For this reason, a focus can be achieved that is independent of the aperture of the material and sharper than that predicted by the Rayleigh criterion. In other words, super-resolution optics should be possible with lenses that are simple flat surfaces. It's worth noting that the Doppler shift and Cerenkov radiation in these materials also work backwards.

Left-handed materials were first envisioned in the 1960s by the Russian physicist Victor Veslago. At the time, it was thought that the material would have to be natural, and since no known amorphous materials or crystals had negative magnetic permeability, Veslago's work was considered purely a theoretical exercise. But in 1996 to 1999, the British physicist John Pendry showed that a sub-wavelength wire and ring array should have just the properties needed to produce a left-handed medium with a negative index of refraction. Pendry's proposal was met with great skepticism by many in the physics and electrical engineering communities. Critics declared that a negative index of refraction was simply impossible, and at least one critic compared the idea of left-handed materials to cold fusion.

However, recent experiments have dissipated these criticisms because it has been demonstrated that one can make three-dimensional arrays that exhibit a negative index of refraction. The Snell's Law focusing was demonstrated in April, 2003 by a Harvard-MIT group for microwaves having a frequency of 10.5 GHz (wavelength in free space about 3 cm), with a measured index of refraction in a meta-material array of $n = -0.35 \pm 0.08$. In February 2004, a group from ITAE-Moscow demonstrated focusing and super-resolution imaging using 1.6 GHz microwaves (wavelength 19 cm). Therefore, it is now clear that left-handed materials can be produced, at least for microwaves, and that they have the expected properties.

While these results may be important

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for advanced antenna design and possibly for radio astronomy, the real payoff will come if they can be extended into the region of visible light. The issue in that region is whether functional meta-material arrays can be constructed at all, and whether the electrical losses and quantum-mechanical interference effects in such nano-scale meta-materials will be severe enough to prevent effective use of their optical properties. One can think of simply scaling down the existing meta-material arrays from tens of millimeters to tens of nanometers. However, conducting wires and rings at the ten-nanometer scale would be chains of only a few atoms, and even if they could be fabricated by advanced nano-scale fabrication techniques, their conduction and field-generating properties would be determined more by quantum mechanics than by classical physics.

Thus, left-handed materials may represent the tip of a very large technology iceberg, or they may simply become a laboratory curiosity that generates a footnote in future optics textbooks. In the next few years we should find out, one way or the other.

AV Columns Online: Electronic reprints of over 120 "The Alternate View" columns by John G. Cramer, previously published in *Analog*, are available on-line at: http://www.npl.washington.edu/av. The electronic preprint listed below is available at: http://arxiv.org.

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See also "Left-handed Metamaterials" on the Web at, http://sagar.physics.neu.edu/lhm2003/NIM.html.

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Warning! Warning!

Guy Stewart

Armand Enugu tugged the glove of the electric blue, form-fitting flight suit on. He mostly ignored the holographic tag on the glove that read, CAUTION: EXTENDED CONFINEMENT IN GLOVE MAY CAUSE CARPAL-TUNNEL-LIKE SYMPTOMS.

He looked up at the rest of his crew. "Any last words?" he asked, grinning.

Julie Phaibulvadhanapongs firmly seated her helmet, ignoring the tinny voice that said, "WARNING: HIGH SPEED IMPACT MAY SHATTER HELMET, CREATING SHARP PIECES." She shook her head. "I don't know about you, but I'm ready to break the light-barrier with my bare hands."

Francisco Morris-Jiles chimed in, "If we have to delay one more time for possible solar flares, I may yank the computer's plug myself."

The wall of the locker room abruptly lit up reading, THIS COMPUTER CONTAINS NO USER-SERVICEABLE PARTS. UNAUTHORIZED TAMPERING MAY RESULT IN ELECTRIC SHOCK.

The message glowed into an empty locker room.

Armand, Julie, and Francisco walked abreast down the wide halls of Pluto Station, stepping into the immense reception chamber jammed with well-wishers. To one side, a thick window looked out on Pluto and Charon as they spun in a slow, silent dance. No one seemed to notice the scrolling message which read, WARNING: THIS WINDOW MAY CONTAIN FRACTURES, IMPERFECTONS, OR OTHER DESIGN FLAWS THAT ARE NOT THE RESPONSIBILITY OF THE MANUFACTURER.

After much handshaking, waving, kisses, and hugs, the three pioneers boarded the shuttle that carried them out to the trans-light starship *Phoenix*—known secretly and best as *Lussa*. Ignoring the various warnings, advisories, and cautions that popped up around them, they rapidly boarded and slid into their launch seats.

Armand took one last look at his crew

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and said, "One small step . . ."

Holographic words sprang up in front of his eyes: PLAGARISM IS AN OFFENSE PUNISHABLE BY FINES AND/OR IMPRISONMENT.

He shook his head and said simply, "Let's go."

Julie said, "At least once we get past the Oort Cloud we won't be in range of Free Warning broadcasts." All three nodded, but before the computer could issue a comment, Francisco sent them into the unknown. They might have been blinded by the tens of thousands of warnings that suddenly sprang into existence around them, but all three lowered their helmet visors, dimmed the internal helmet displays, and squeezed their eyes shut. The *Lussa* shuddered and went trans-light.

A day later, the ship passed through the Oort Cloud, and after another display of warnings which they ignored, the holo messages decreased significantly. Another five days saw them halfway to Proxima Centauri.

Seven days after launch, Armand stammered, "It's . . . it's . . . a message from Proxima Centauri."

Francisco said, "Standard code. Our equipment is having no trouble receiving it and interpreting it, though the transmission frequency is a bit odd." He paused. "It's a visual image."

"Put it up! Put it up!" Julie exclaimed.

"On screen," Francisco replied.

The message blossomed orange on a deep blue background: GREETINGS AND WELCOME TO THE SISTERHOOD OF INTERSTELLAR COMMUNITIES.

The message vanished. The three pioneers exchanged glances and grins. Francisco said, "Second message."

Once again, it blossomed orange on a deep blue background: WARNING: INTERSTELLAR SPACE EXPLORATION MAY BE HAZARDOUS TO YOUR CIVILIZATION'S HEALTH. DISASTERS EXPERIENCED BY YOUR CIVILIZATION ARE NOT THE RESPONSIBILITY OF THIS FIRST CONTACT MESSENGER NOR OF ANY PARTY TO WHICH THIS MESSENGER IS RELATED IN ANY WAY. . . . □

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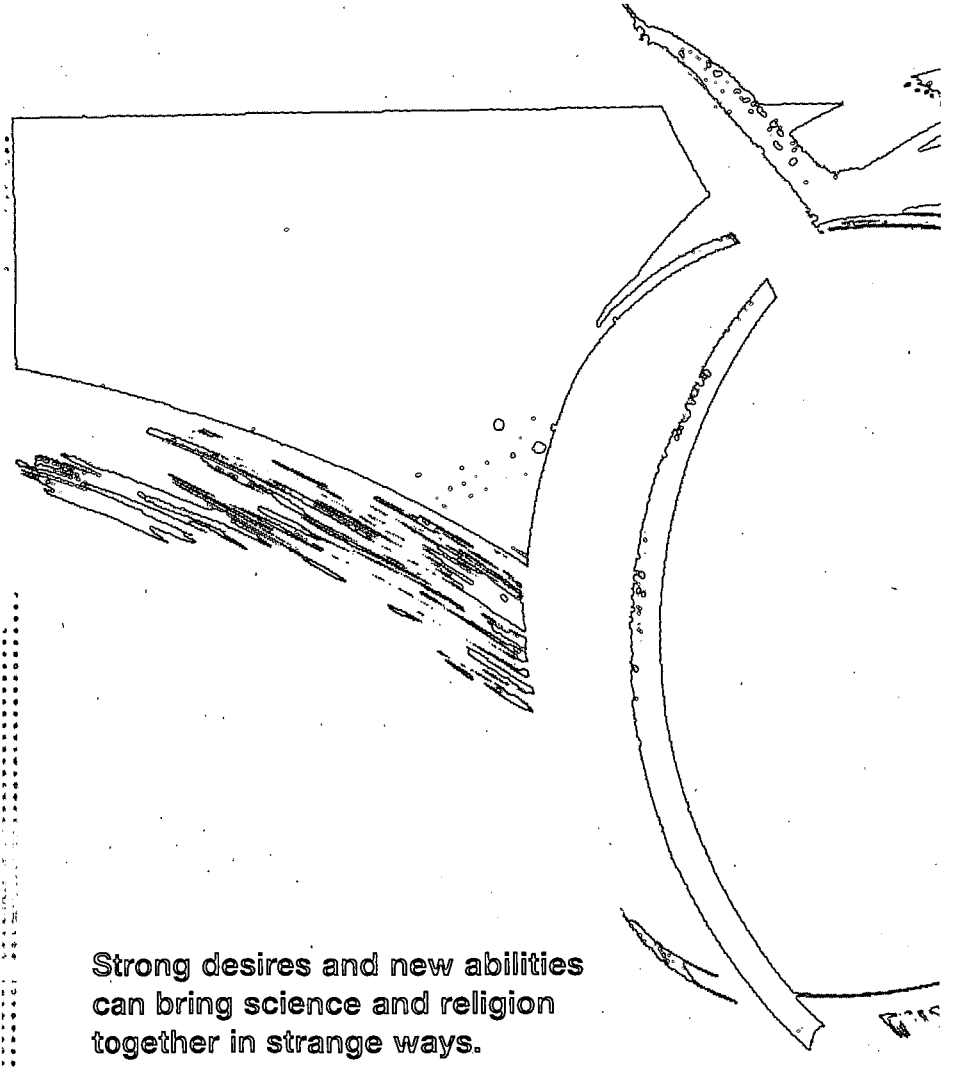

Strong desires and new abilities can bring science and religion together in strange ways.

An Old-Fashioned Martian Girl part III

Mary A. Turzillo

Illustration by Vincent Di Fate

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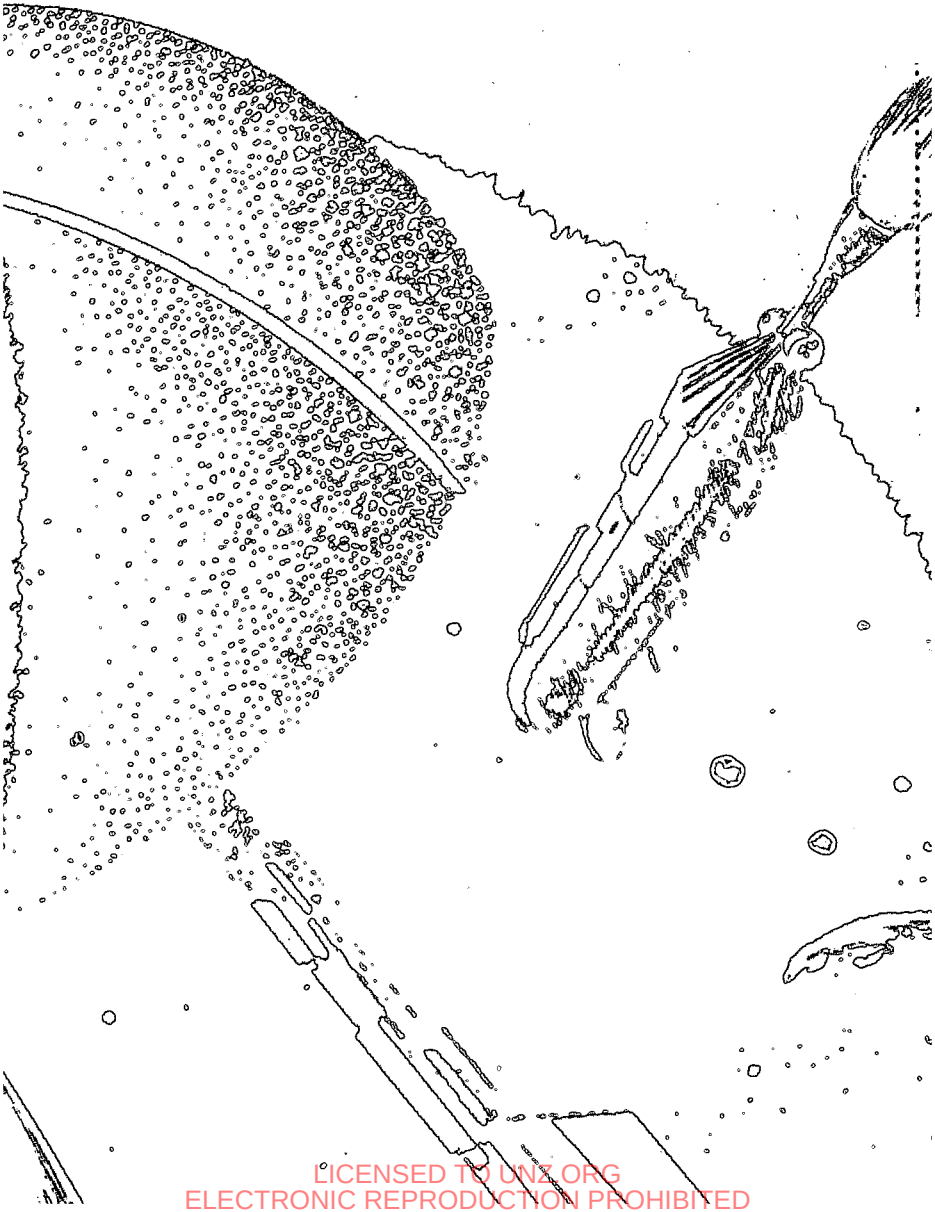

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What Happened in Parts I and II

NANOANNIE CENTIME, *an out-of-control Martian adolescent, and* **KAPERA SMYTHE**, *her preteen buddy, are investigating the disappearance of Kapera's parents, scientists* **ZORA** *and* **MARCUS SMYTHE**. *Kapera is captured by cultist* **FACERS**, *formally called the People of the Face on Mars. The Facer leader,* **DR. SPHYNXEYE**, *and a motherly, patronizing Facer nun,* **CRYSTAL SPIRIT**, *think Kapera or her parents have made some sort of momentous discovery, and they're not about to let her go. Kapera's only ally among the Facers seems to be a young tough named* **CAYCE JONES**. *During an attack by a renegade faction of the Facers, Kapera broadcasts a plea for help, and Nanoannie hears her. Nanoannie steals her parents' Marsplane, the* **ORIGAMI FIREFLY** *and rescues Kapera from the Facers.*

Nanoannie has mixed motives for her loyalty to Kapera. She's noticed that Kapera has a wrist puter, on which she keeps writing messages—in diary form—to her older brother, **SEKOU SMYTHE**. *Nanoannie's social life on an isolated pharm on Mars has been nil, and she fantasizes meeting and falling in love with Sekou. Together the two girls fly to Nanoannie's parents' winter home, Plantation Centime, in the southern hemisphere of Mars.*

At Plantation Centime, Nanoannie's family has huge fields, under monofilm, of plants bioengineered to extract fuel from the Martian soil and atmosphere. Nanoannie hopes to fuel up there in order to search for Kapera's parents. She confides to Kapera that she hopes to avoid the boring life of a tation. Nanoannie is imprisoned in a utility shed while Kapera, passed out from her illness, is kept for questioning. Before the attackers can take Kapera way, Nanoannie gets loose and steals Kapera's wrist puter, planning to give it to Sekou, whom she still yearns to meet. The corp geeks take Kapera to Utopia Headquarters, which happens to be the corp that owns Nanoannie's family pharm. Nanoannie follows in the Origami Firefly, *but is shot down.*

At Utopia, she learns that the comatose Kapera is under study along with a strange concoction in a thermos called Hyper-K. Nanoannie is imprisoned again, this time by Elvis Darcy, but she attacks him with an antique typewriter and escapes. She finds Kapera and carries her unconscious to a launch area where she hopes to steal a plane. But there's been a coup. Utopia has been invaded and overthrown by renegade Facer nuns intent on stealing the Chrysalis, *a generation starship.*

The two girls are captured by the nuns and forced aboard the life support module of the ship. Once aboard, Nanoannie discovers she is among several hundred Utopia hires and others shanghaied to be the unwilling colonists of Yggdrasil, a planet ten light years away. She will be frozen for the 200,000-year trip, but first she is forced to marry Elvis Darcy. He's supposed to impregnate her, but, nice guy that he is, he declines the opportunity. And he reveals that he's the founder and C.E.O. of Utopia. He wants to fight the Facer nuns who have captured them. But the Utopia supercomputer has a mind of its own, and he can't control it, or help them escape.

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Would Crystal Spirit make *me* get married? On Earth, they used to marry off girls way too young, make them baby factories. This would be a terrible idea for a person with health problems, like me, for example

A pregnant nun named Journey's Jewel took me to a cabin. She gave me hot chocolate and vitamins. Said the chocolate was for the celebration. Nuke stuff! Didn't make me sick, not a lick.

I dozed off. I know, Sekou, I should try to get my sass in gear and find our folks. But I had to close my eyes for just a minute.

I woke up alone, strapped in a bunk. Five other bunks hung on the walls, one with pictures of an Asian-looking guy pasted above it, maybe the boyfriend or husband of the person that slept in the bunk. I read his name: Puntul.

I looked at the cabin door and wondered if it was locked.

Just then a pretty Asian girl in a Facer habit came in. Her high, square forehead was decorated with a Face bindi that looked like Buddha. Prettier than most Face bindis, truth to tell. "My name is Flowering Tenacity," she said, "but call me by my birth name, Ooee."

"Mine's Kapera. Sorry I don't get up."

"I know, I know. Welcome to our cabin. We'll be cryoed, so we won't mind the crowding, just as fast as they can distribute the treatment."

"I can't do this." I didn't cry. I know I didn't cry. Still, she came over and put an arm around me.

"Keep a cool heart," she said. "Nothing can truly hurt you if you relax."

That sounded like Buddhist stuff. "How did you get here? Were you captured at Utopia Limited, like me?"

"No. My boyfriend recruited me. I was a Land Ethic Nomad. My mother came to Mars as a webalog bride and after my father died, she ran away with the nomads."

"That your boyfriend in the picture?"

She burst into tears.

I had to ask, "He's not on the hab module?"

She snuffled. "He was selected to go. But he's still at Cydonia. I can't talk to him. They're jamming com traffic. But I saw the list, and he's not on it."

She was trying to calm herself. Afraid I'd get her all sad again, I couldn't think of anything to say.

She asked, "You have somebody who'll be left behind?"

I explained about Mother and Dad and our messed-up travel plans. "I like to explore, but I need to be healthy to explore. Anyway, I'd just as soon explore Mars. And listen, this cryosleep treatment: does it work, or are they playing us?"

She nodded eagerly. "Oh, yes. It was developed by Drs. Marcus J. Smythe and Zora Miriam Smythe. They are geniuses and I'm sure it will work."

Say what? "Those are my folks. How come I never heard about this?"

"Your parents? The famous Smythes?"

"Famous? Come again?" I undid the straps and stared at her.

"Maybe not among the uneducated, but the Diaspora Nuns venerate them."

This was pure crazy! "If they're so famous, where are they?"

In a teensy voice, she said, "Nobody knows. Everybody thinks you know."

"I sure do *not*!"

"Calm, calm," she said. "Keep a cool head and a cool heart."

I told her my recent adventures.

She nodded. "Who is this other girl you've been traveling with?"

I told her about Nanoannie's pharm and plantation, and so on.

"I bet I could reunite you with her. Could she help you?"

I clung to the bunk and stared at the door. "In the past, she's more often got her and me in ice water."

"Let me understand: you don't want to go to Yggdrasil, because when they unfreeze you, you'll still have leukemia."

"Right. And the cryosleep process won't make it any better."

"If you were frozen, your parents

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would have time to get you to Earth Orbitals."

"Of course. But it looks like I'm going to Yggdrasil or whatever you call that crazy planet."

She rearranged her robe over her knees. "Speak respectfully of the Mother Planet. And maybe the Builders of the Face *can* cure you."

"If they exist."

"Please, please don't utter such blasphemies. True, their medical techniques might not work on humans." Ooee had great posture, even in microgravity. Nanoannie always slouches, despite being fit. Nanoannie looks like a big tiger, while Ooee looked like a sleek black cat.

A loudspeaker blared into the cabin. The mechanical woman's voice (sweet and motherly sounding, of course) said, "Please go to your bunks. They are designed to function as acceleration couches."

She got strapped in just before the lurch of motion. That launch was the loudest thing I ever heard. My ears are still ringing, and I would have been scared to death, but here I was, going up into space. First time, yup!

Puntul's picture came loose. Ooee tried to grab it, but her hands were too heavy. I managed to turn my head to look at her. Acceleration pressed her robe down on her body.

Her tummy was a little round hump.

Like they said, this cabin was for women who were already pregnant. The redsuits didn't bring Puntul because he already gave them what they wanted.

Then we were floating free. I fought my own kweez, which got worse when I heard—and smelled—Ooee using a barf vacuum. I squeezed my eyes shut.

After a while, I felt her touch my shoulder.

"Your friend might have ideas about finding your parents," she said. "Maybe I can persuade Security to let you see her?"

"Nanoannie just got married to some guy she doesn't know," I said miserably.

"How sad! But if I can bear being separated forever from my baby's father, Nanoannie will survive being married. She might even learn to love her bridegroom."

Give me a break! I thought. But I let her tow me like a balloon on a string, out the door and down corridors filled with kidnapped corpgeeks handcuffed to Facers in red robes.

Chapter 27
Visit from Ooee and Kapera

Nanoannie floated in the corner of her bunk, determined not to spoil the occasion by throwing up.

It might be sexy to found a new race on a planet hundreds of light years away. But not without Sekou. Not married to Elvis Darcy, the man with no pheromones.

Floating unaffected by the microgravity, he was using his com. A new one, not the one she'd thrown into the toilet back in Utopia.

That evil red nun with the 3-D tattoo said the couples had to take turns in the bunks. When would the other roommates show up? How had they managed without acceleration couches?

She was not convinced that Elvis Darcy was going to leave her alone. Soon their sleep shift would be over. She would be very tired, since she was not about to fall asleep and let her bridegroom take advantage of her. And where would they go when another bride and groom arrived?

Curiosity got to her. "Aren't you nauseous? Are you a robot or something?"

He looked at her, upside down. "I'm used to microgravity. Utopia Limited has a satellite office on Phobos."

Somebody knocked.

Oh great! Enforcers, to make sure everybody was getting pregnant! How could she defend herself in micro-gravity? They might have tanglefoam or zappers.

What would it be like to be raped

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while zapped? Her vagina shrank up into her body like a cuy hiding from a hungry pharmer with a stew pot and meat cleaver.

Elvis Darcy froze, staring at the door.

She scowled. "What do *you* have to be nervous about?"

He laughed grimly. "How long do you figure I have to live? I'm the opposition leader."

"But you're—"

"A valuable stud animal? Plenty more where I came from. Stay out of the way. No reason for you to get hurt."

Oh. And what if he used her as a hostage?

Somebody unlocked the door.

To her surprise, in floated Kapera and a pretty Facer girl.

The Facer girl nodded at Elvis Darcy. "I think you should leave."

He was gone before she finished the sentence.

Kapera's skin had a gray cast. Her eyes seemed swollen, her face bloated. Nanoannie wished she'd asked Elvis Darcy if his geeks had grabbed the Hyper-K.

But maybe the Hyper-K was just a placebo.

The Facer girl pulled herself over to Nanoannie's bunk, wafting a delicate flower cologne. "Your friend Kapera says you can help her find her parents."

Nanoannie tried not to sneer. "Your Facer friends probably murdered them!" Not to dash Kapera's hopes, but they had to be realistic. "I mean, they wouldn't just abandon you, Kapera. What other explanation is there? And you've missed the launch window for the shuttle to the Down Escalator."

"No," said Kapera. "My daddy would never just walk out on me. Neither of them would."

"People of the Face don't murder innocent people," said Ooee. "But they could be dead."

"Maybe." Almost inaudible.

Nanoannie didn't like this. Parents are not supposed to die. Krona and Escudo would definitely not allow themselves to be murdered. "But why be negative? Let's assume they're alive and try to figure where they went."

Kapera said, "After I took the rover to your pharm, my father sent a message telling me *not* to come back."

Ooee nodded. "He must have felt you would be in danger."

"And when I did come back, somebody had trashed our pharm."

"Looking for something," said Ooee. "Probably the cryosleep lab notes."

Kapera bristled. "I would have known if they were inventing—"

Nanoannie interrupted, "You said you were too sick to help. You once did, but then you stopped."

Kapera thought for a moment. "You're right. And always just my daddy's projects. My mother's so bossy she never lets me do anything."

Ooee said, "They had separate projects?"

"My mother was more interested in the *Deinococcus radiodurans* and bacteriorhodopsin experiments." Again, Kapera knew all those biotechnie words. It seemed suspicious.

Nanoannie noticed Ooee fingertipping. Her puter was probably in her pocket, or even implanted. Ooee, noticing she had noticed, smiled and said, "I'm taking notes. Anything might turn out to be a clue."

Ooee's funny tattoo smiled, with its eyes closed. Was it alive? All the Facers had them. Yet Nausicaa Azrael hadn't mentioned them in her thrillers.

Nanoannie said, "Kapera, how do you know this stuff? You're super smart, but so am I, and I never heard of these bacteria."

Kapera grinned. "No, but you know all about the magnesium-concentrating plants."

Ooee nodded. "You kids are smarter than city kids in land-based classrooms. You're like Earth children in the Middle Ages, learning by watching and helping. I always wondered how some twelve-

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year-old medieval king—he'd be about six mears old—could reign competently. Or how a child could be Dalai Lama. Our pharmers educate children differently. Home schooling."

Nanoannie sniffed. "For your information, we do not goof off on our lessons."

"Of course not. You're good old-fashioned Martian girls."

Good? thought Nanoannie.

"You haven't accepted the Dialectic of the Face, but you're good girls."

Kapera rolled her eyes.

Ooee smiled. "I see you're looking at my Face bindi. You should ask Crystal Spirit if you may have one. They symbolize our bond with the Builders."

"Thanks anyway," said Nanoannie.

Ooee pushed herself gently away from the ceiling. "So, Kapera, tell me about bacteriorhodopsin."

"It's a dye made by bacteria, like the dye in your pineal gland, also in your eyes."

Ooee nodded, impressed.

"They use bacteriorhodopsin to make computer chips. But you know that. We don't have to follow safety guidelines like on Earth. My folks designed a strain that made a lot of money for Vivocrypt. That's how they bought out their contracts and became Freemen."

"Wow," said Ooee. "I'm so impressed with you girls. What was your mother doing? Making even better puter chips?"

Kapera shrugged, which looked weird, since she was floating perpendicular to Nanoannie. "Looking at Mars halobacteria and also *Deinococcus radiodurans*. She said they had done okay millions of mears on Mars and—"

Nanoannie suddenly realized where this was going. And by the look on Kapera's face, she did too.

Ooee was fingertipping like mad. "So you did *not* work with your mother. And you had no idea how her research was going."

Kapera was silent.

Ooee smiled. "You know, Kapera, she could have started the research to help you."

"She did not!" But Kapera's expression was thoughtful.

"Think of it this way. She was working on genetic variations to be inserted into human cells. These might preserve cells for hundreds of thousands of mears. If it was cold enough, maybe millions."

"Like the cryosleep you redsuits are going to use on us."

"You mean we People of the Face?" Annoyance crept into Ooee's voice.

Kapera mused, "So that's where Vivocrypt got the cryosleep. From my folks. My mother, mostly. She sold it for our freedom and our pharm. And now Vivocrypt can sell their old slow engines to the Facers to power the *Chrysalis*, to go to Yggdrasil. Even if it takes a million mears."

"Yes," said Ooee. "I suppose I should have filled you in on that. Your mother didn't want you to know what she was working on. Something that might help you."

Kapera glared at Ooee. "Don't come telling me trash like that."

"Think about it. If she could freeze you, without injuring you, it would buy time. The disease would be slowed down."

Nanoannie butted in. "How do you know all this? And if you know it, why are you trying to get us to tell you about it?"

Ooee smiled. "I wasn't sure how much you knew. And I thought if we chatted, you might remember information to locate your parents."

"So this is not something new she was working on?" said Nanoannie.

"Oh, no. It's been around for mears. Long enough to build and outfit a ship, and long enough for Utopia and Vivocrypt to vie for which company would provide the propulsion system."

"So what are you saying my mother was about?" asked Kapera.

Ooee drifted against a bulkhead and tucked her robe around her feet as if from some compulsion to hide them. "If

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you don't know, I certainly don't."

Understanding was dawning on Nanoannie.

Ooee continued. "Most importantly, where are they? Especially your mother. You need to be reunited, don't you?"

Kapera said, "It's hard to do the I-spy-private-eye routine when you're ailing and people keep kidnapping you."

Ooee's eyes grew liquid with sympathy. She ignored the barb about kidnapping. "Poor, brave child. I hope I can help."

Nanoannie felt irritated. "I've been trying to help her. I would like to meet her brother, actually. But in case you didn't realize, people keep kidnapping me, too."

Kapera scowled. "Say what? My brother?"

Ooee said, "Oh, you too, Nanoannie! How tragic to be wed to one you do not love, when your heart belongs to another."

How did Ooee know that?

It didn't matter. Nanoannie was afraid they'd all float around having a good cry, and the next shift would come back and make them leave with nothing accomplished.

Ooee continued, "So, Kapera, let's brainstorm. Do your parents have friends they might go stay with?"

"We didn't have time or funds for travel. My grandmama lived on Earth, a country called New Jersey, but they wouldn't walk off and leave Mars without me."

Nanoannie said, "Could somebody have convinced them you were dead?"

"My mother was the logical type, so maybe. But Daddy? No way!"

Ooee said, "This isn't getting us anywhere. Wouldn't they attempt to contact you by com?"

Kapera looked like she was going to cry. "The kidnappers swiped my suit com when they took me to Cydonia. For all I know, my folks were trying to contact me on it. Crystal Spirit probably copped it."

Ooee bit her lip. "No, I don't think so."

"And why not?"

"I'd know if she had. Let's try to imagine where they'd go. They killed the Naguchis—"

Kapera shrieked and threw herself at Ooee. Nanoannie launched forward to separate them. At once Kapera subsided, coughing and wheezing. A blob of blood oozed out of her left nostril and floated into the room.

"So sorry," said Ooee. She chased the blob and caught it in a handkerchief. "I meant, maybe they killed them accidentally, or in self defense."

"No," hissed Kapera. "Just forget that."

Nanoannie said, "Wait. How did *you* find out the Naguchis were dead?" She and Kapera had never reported the graves.

"Yeah, I never put *that* business on the street," Kapera told Nanoannie defiantly.

Ooee said, "I think they were found. Anyway, let's role-play. Your parents feared being convicted of the Naguchi murders. Not saying they really killed the Naguchis. But they had to drop off Marsnet. No com contact with anybody, unless they had some way of contacting you. Were they friends with your parents, Nanoannie?"

Nanoannie's mind did a flip-flop. "No. My parents only met them once, at a tunnel fair."

Ooee looked into the middle distance.

Kapera said, "They knew some Land Ethic Nomads."

Ooee narrowed her pretty eyes. "That's a thought. What did your parents have to do with Land Ethic Nomads?"

"Not much. They always gave them a hand, if they came by needing oxygen or medicine. Land Ethic Nomads don't believe in making babies on Mars, but they were nice to me, even though I was a kid. The few times I ever saw them."

"Do you remember which tribe?"

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"No. But I recollect a few names. Ringo, Malila, and Chocko."

"They didn't have last names?"

"If they did, I never heard them. Might be somewhere in the com back at our pharm."

Ooee said, "I don't think so."

"How could we contact them?"

Ooee fussed again with the hem of her robe. "Land Ethic Nomads tend to immigrate to Mars illegally or jump their contracts once they get here. They are usually undocumented, and if they use electronic communication it's through friends like your parents, who forward messages. I know all about Land Ethic Nomads. My mother joined a tribe after I was born."

Nanoannie said, "Would you recognize those names?"

"Cydonia's Population Department estimates there are over nine hundred Land Ethic Nomads on Mars, in about sixty tribes. A single tribe will have a life support bubble and five or six rovers. They move around all the time and Marsnet can track them only by satellite. If Marsnet loses track of one during a dust storm, it's never sure it's tracking the same one again. They can hole up in lava tubes or pharms for a long time."

Escudo and Krona were afraid of Land Ethic Nomads, told stories about them demolishing pharms in their zeal to keep Mars from being overrun by civilization. They wanted to return everybody to Earth and keep Mars for study only. But although they lived simply and didn't have children, they were changing the face of Mars just like the corps, pharms, plantations, institutes, and cities.

Could nomads have trashed Smythe Pharm?

"They were good folks," Kapera murmured. "Traded us handmade shirts for oxygen, water, and eggs. Little pots of marijuana and fake chocolate, too, but we couldn't use those."

"So many mysteries," Ooee murmured. "If you were able to broadcast a message to your parents, how would they know it was you, and not a trap?"

Kapera said, "I'd tell them something only they and I would know. Like—"

Ooee held out her hand. "No. Don't tell me. Something about Hyper-K?"

That Hyper-K thermos again! Why hadn't she asked Elvis Darcy? Maybe one of his corpgeeks brought it aboard.

"No." Kapera closed her eyes. The smear of blood on her upper lip contrasted with her gray complexion. Her face was deceptively chubbier than it had been, morbidly swollen from microgravity. "I can't think of anything."

"Well," said Ooee. "I wish we knew more. Maybe I should see if they've caught your bridegroom, Nanoannie."

"Will they hurt him?"

"Whoever suggested such a thing?"

"He's, like, the opposition leader and all, in case you forgot."

"The People of the Face, including us Sleepers, are nonviolent," said Ooee. "Don't worry about him. I don't suppose you're getting a little fond of him?"

Nanoannie curled her lip.

"I understand. You want a love match. Well, let me give you girls a few minutes to chat while I investigate."

Kapera and Nanoannie looked at each other.

Ooee pressed a key card to the door and pushed herself out, skirts drifting around her legs.

Kapera said, "If I could contact my folks, I could mention a little Sojourner model I made."

"Anybody might know that from a background check."

"Yeah. And the Facers know about the Hyper-K, so my folks won't tumble for that."

"How about Sekou? Is there something about Sekou you could mention?"

Kapera was quiet for a minute. "Like his existence? Maybe. Let me think. The diary?"

"Sekou is unregistered?"

"Not—exactly. I could mention how my mother and I fought about my priva-

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cy. She got my house diary password somehow. She must have been stone frustrated when I got the wrist puter. I caught her prying open its case, as if that would do any good."

"What was your password?"

"I suppose it doesn't matter now." She squeezed Nanoannie's hand. A weak squeeze, but it meant a lot. "Thanks for saving my wrist puter."

"On second thought, don't say the password."

"Why? Whoever wrecked our pharm got everything that was on the house puter, and my diary was the least of their interests. It was—"

"Don't say it! This cabin is bugged." Elvis Darcy had to be right about that; the corp used bugs, big time, for industrial espionage. They even developed bug spray to destroy them.

"Right." Kapera curled up and closed her eyes. "I sure miss my folks, though. Maybe they think I'm passed over and dead."

Nanoannie let that statement float in the room like a moon in a winter sky. Either moon: Fear or Panic. "Suppose you cooperate with these Renegade guys. Told them you would contact your parents, get them to come pick you up. What do you have to lose?"

Kapera straightened and pushed herself toward Nanoannie's bunk. "Then they'd have my folks *and* me. They'd never let us go to Earth Orbitals."

"You could make them swear."

"On what? They think their stupid starship is more important than me, or you, or anybody. I still think they killed the Naguchis, and probably Dr. Sphynx-eye, too. Why should they worry about me? They'd give their word, then go back on it. You heard Crystal Spirit. She says, 'Oh, yeah, you have leukemia, you'll die unless you go to Earth Orbitals, we're sorry, you're going to Yggdrasil, anyway.'" Kapera's voice shook.

Nanoannie had figured this all out. She was also a suspicious of Ooee, so simpatico, who had left them alone with probably a million bugs in their clothes and hair and on the wall.

They exchanged knowing glances. Kapera cocked her head. "Who was that guy you married?"

Nanoannie felt a flush of rage. "I am not married to him! Marriage is not legal without consent. He is a creep and I will not have sex with him!"

"Right. But who is he?"

"Elvis Darcy. He used to come around snooping at my parents' pharm. Now he says he's the CEO and founder of Utopia Limited. They own my parents' contract."

"Wow. Can't his corp do anything?"

"He says the corp is an autonomous AI. It maximizes shareholder value, and he can't stop it. Anyway, the Facer nuns probably blew it up."

"Is he coming back here?"

"He's trying to escape. He says they'll kill him after—you know—after—"

"After you do the nasty, and you get pregnant?"

"Yes. But they could kill him and then do me with artificial insemination. Mars bars, they could even use me to grow a clone of Crystal Spirit, if they wanted."

"They wouldn't, though."

"Why not?" Nanoannie shuddered; being pregnant was not part of her dream world.

"Because they would want tons of variety. Maybe even non-human genes. My father told me about a Vivocrypt project with human plus shark DNA."

"That's sick!"

"Huh-uh. Not really. Humans aren't perfect. Our genes could be improved."

Nanoannie stared at Kapera. "Have you gone global? Why are we talking about this stuff? I just want to go home. I don't care if my parents chain me to the plumbing for the next ten mears. I don't want to go to Yggdrasil and be a brood chicken."

But then she thought, *A new world. It might be totally nuke, to be an explorer.*

But not without Sekou!

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"Yeah. Me neither. And all this talk gives me the kweez."

"So what are you going to do?"

Kapera said, "Let them broadcast an appeal for my folks to come fetch me. I'll make Crystal Spirit promise not to arrest them for killing the Naguchis."

"You think she'll keep her word?"

"It doesn't matter. My folks didn't hurt the Naguchis, and my father is smart enough to prove it."

"What if he isn't? And do you think they'll ever let you all go?"

"That's a problem. They'll promise anything and then keep us prisoners. But I have an idea. It has to do with our friend Ooee."

"It does?"

"She's part of it. I bet if we just mentioned her right now—"

Two minutes later, the door wooshed open, admitting that delicate flower fragrance.

Chapter 28
His Message to Mars

The Chrysalis, *Summer-April 19, 2202:*

Dear Sekou,

My idea is: I will play the Facers' game and lure our folks here. But first they have to let Elvis Darcy go. Here's my story: Nanoannie thinks he's the greatest thing since solar cells, but his destiny is on Mars and she wants to sacrifice herself for him.

I hope I can say that with a straight face.

They'll be relieved to get rid of him because he's big trouble here on the *Chrysalis*. Let him go start a new corp.

I thought of making them let *her* go, but I know they won't. They like girls because girls are baby factories. Yich.

So it has to be him. I'll make him promise to hire a detective and prove that our folks are innocent. If he's straight up, he'll do it, and he'll drop it on everybody how we've been kidnapped. Put the Facers' business on the street. The newsnets will cause such a stink that they'll let us go. And maybe it's not too late to hire a special shuttle for our family to the Down Escalator and from there, to Earth Orbitals.

Another thing. I've read through all my old postings, plus that stupid posting of Nanoannie's, and I'll have to set her straight about you, Sekou. Soon.

Chrysalis *Life Support Habitat, later in the sol:*

Everything went wrong.

They caught Elvis Darcy hotwiring one of the soyuzoids the Nuns keep to evacuate people, or maybe to take Crystal Spirit back to Mars. Anyway, it was equipped to handle five people, and he was with four others, Utopia corpgeeks, real honchos. He managed to send a newsnet broadcast through the local net before they went and jammed it from getting all the way to Marsnet. He managed to send it over an emergency com system built into the ship. I grabbed it, and here it is:

"To the people of Mars from Elvis Darcy, founder and chief executive officer of Utopia Limited: We pride ourselves in integrity, and we had a contract with Dr. Percival L. Sphynxeye of the Cydonia Institute.

"Utopia Limited has evolved, as Mars corps do, to autonomy programmed to maximize shareholder wealth. Unlike some entrepreneurs, I programmed restricted ethical directives into Utopia Limited.

"I am now barricaded in and struggling for control of a soyuzoid—which is Utopia Limited Property—with four employees: Raddol Pixel, Tinquesta Veracitoni, Fox Wanglee, and Thamnoon Sobsatrasorn.

"We are detained illegally. The fact that no pan-Martian militia exists to enforce our rights does not invalidate them.

"The Renegade Nuns hacked Utopia to frustrate our launching back to Mars surface. This illegal—"

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Sekou, to this point it sounded like he was reading from a set speech, but now his voice went wacky.

Nanoannie looked like she was in shock. I quick asked did she really care for him, since she was married to him and all, but she snapped, no, it wasn't that.

I asked if she was aggravated just because he wouldn't carry our story to folks on Mars, and she said not really.

She said it was because Elvis Darcy was a brave guy and he had been trying to rescue all of us.

Was he, for true?

"—basic right to decide whether to enroll in a vast interstellar experiment," he said. "The renegade Face faction coerced Utopian employees into a one-way trip to a planet that may not be even as habitable as Mars. In their twisted fantasy, these legendary Builders will help them survive. I call upon the people—Let me finish, Raddol."

He threw away his script at that point. "Let me—You! Crystal Spirit, if you're listening! Has it occurred to you that *maybe you're wrong? That your brains have been fried by standing out in the environment kissing the Ass on Mars? That you let the wind in your helmet and it filled your skull with dust? Even your cuy-brained Dr. Sphynxeye*—what?"

A soft, shocked question.

"They what? They can't! They don't have the codes. No! Don't fire the pyrotechnics! We've got no life—"

Nanoannie and I looked at each other. She said, "At least we didn't give him your wrist puter."

Screams, first angry, then hurting, bad. And then no sound at all.

Which I figure is what happens when you blow the airlock on a soyuzoid.

Nanoannie broke the silence. "You think they're dead?"

I nodded. "He had the codes, but Crystal Spirit must have gone and blasted the soyuzoid off without detaching the umbilical."

She pushed away from the bunk and floated in the center of the room. "Yeah."

"Did you kind of like him?"

"No. Yes. He kidnapped us, and tried to shoot me with tanglefoam once, but he could have raped me, and he didn't."

"Mmm-m-mm, what a hero."

"I saw women dragged down the halls. One of them was begging her 'husband'—ahh, what do you know? You're a kid."

"I know I wouldn't want to be raped. Even if it the Facers had 'married' me to the guy." For true, Elvis Darcy never had a chance. Ooee was sent here to snoop, and she let him bail knowing he couldn't get far. Maybe they wanted to see what he'd do. Now they knew.

Nanoannie was crying. Should I comfort her or look away?

I started bawling, too. I got hiccups after a while, and then my nose started to bleed again. I hate this! I hate this! I hate this!

Somebody's opening the door.

Still somewhere in space, maybe in orbit, still on the Chrysalis*:*

Well, I'm not in Nanoannie's cabin anymore.

The person at the door was Ooee, and surprise, surprise, Crystal Spirit was with her. Pregnant women look stone dumb in microgravity. Like guppies with human heads. Plus they wear those sorry red robes, which catch on everything and float up and show their underpants. You'd think they'd have more class.

They dragged me away from Nanoannie. Last I saw of her I think she was trying to strangle Crystal Spirit. Can you imagine? Then somebody came and tanglefoamed her.

They took me to a suit locker room. Ooee fitted me up with a EVA suit. Not an environment suit. She won't tell me anything, but I betcha I'm not going back to Mars.

While we were there, the *Chrysalis* rockets fired again and we got thrown

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around.

I asked what would happen to Nanoannie and she said (get this): "The Widow Nanoannie Centime will be provided for."

I said I wanted the Widow Nanoannie sent home, or I wouldn't cooperate.

She smiled and said I was already cooperating, thanks so much.

When we get to Yggdrasil, will those beastly tanglefoam guns still work? Thousands of mears, Sekou! We'll still be alive, floating along until the vacuum dries us out. Or will they put us in suits? Could either corp provide suits that good? Or a ship that still works when it reaches Yggdrasil?

Or do they think the Builders of the Face will rescue the ship and land it for us?

All the other suits in this room are all designed with big bellies.

Ooee is coming for me now, with my helmet. Maybe they're sending me to the Down Escalator.

Doesn't hurt to look on the bright side.

Mars High Orbit, Space Station Home, *April 20, 2202:*

Dear Sekou:

The Facers have a space station in high Mars orbit. Saw it sparkle in the sky, never thought I'd check it out in person. Its teeny observation deck looks at Mars and sometimes at Phobos cruising by.

I don't know much about your short life, before I was born. Did you get to go up in space? Did you ever look down on Olympus Mons and the Tharsis volcanoes and Valles Marineris, and the light of Equatorial City glowing when the terminator passes over it? It's so fine, Sekou. We are so lucky we were born on Mars. I was a little luckier—I got to actually *live* here a while.

Dad played a game of what-if with me when I was about two and a half, just tall enough to get my own drink of water. Like, what-if we had a time travel machine and could go back to Mars when it had an ocean? What-if we were born in the far future and could go to another star, live on a planet there?

Oops. That "what if" may come true.

Even if they don't take me home, maybe maybe maybe I really will meet the Builders of the Face, and they can cure my leukemia.

What if we had been born on Earth?

The school tapes say Kiafricans were in danger on Earth. They said the laws of the corp Mother and Daddy lived under—or was it a country?—said they had to give Kiafricans an equal chance, but sometimes the Caucasian people cheated and made it look like they were being fair when they weren't. Even after three centuries of trying to straighten out the laws, the countries where Kiafricans lived had a lot of stealing and murder because the Caucasians ran the police. Sometimes, even, a Caucasian person would commit a crime and blame the Kiafricans.

Our daddy always said that was then, this was now, and we children would have a better chance on Mars, with different nationalities, and the Caucasians not running everything.

But the corps run everything, and they aren't even people! Luckily, our folks worked hard and were smart, and their inventions and discoveries paid off to make us Freemen.

Did Dad talk about this stuff to you?

Anyway, I played the what-if game in my head as I checked out Mars gliding below the station.

What if we stayed on Earth? No leukemia, no kidnapping by Facers. Good doctors with the latest cures. Not like on Mars, where the doctors are all frontier types, and they don't even have stuff like stem cell therapies.

But maybe you would have died in a drive-by shooting or school invasion. Maybe I would have been raped and gotten Hepatitis Q.

Made more sense to concentrate on the view.

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Mars is so *big*. The sparkles of lights glow on when the terminator passes so you know how teeny us humans are next to the canyon that could swallow a moon, or the huge mountain that sticks up out of the atmosphere into space. How could I look at Mars and be sad or afraid?

I watched a long time.

And then—

I have to stop now, Sekou, and hug our daddy.

In Mars High Orbit, still, aboard Space Station Home, *later that sol*:

Dear Sekou, dear brother of my blood, brother I hardly remember, brother I won't see until—

Daddy came here. He found me.

I'm so glad, I could jump! He'll know exactly what we should do.

He's thin, Sekou. He looks worn out. His shirt is just like the one he had on under his suit liner when I saw him last, only this one is raggedy and worn and faded.

I bet it's the same shirt. Maybe he just keeps washing it, cause they didn't have time to pack.

He grabbed me and we floated together, both teary.

"Daddy," I said, when we got through hugging, "they claim you killed the Naguchis."

His voice is deep, like it came from some humongous but gentle giant. "No, sugar, I hate to spoil your image of me as a wild rebel, but I haven't killed anybody."

A horrible suspicion came over me. "Mother—"

He grinned. "Girl, your mama is no murderess."

"I knew that. I knew it! But who killed the Naguchis?"

"Far as I know, the Naguchis are still alive at Smythe Pharm, which they paid a fair price for, although the funds never transferred."

"Daddy, I hate to tell you, but some dead people are buried back of the hab. Nanoannie dug it up, and we found two people, and they look Asian to me."

"With luck, sugar, those are the Naguchis. But they're not dead."

Chapter 29
Orientation

The Facer nuns killed Elvis Darcy. This was worse than any Nausicaa Azrael thriller. These "Sleeper" Renegade Nuns were real, and did worse things than suck your bodily fluids.

Was it the end of Kapera, too? No, Kapera had survived so much. Mars and stars, she'd survived a coma in a defective medical carapace, who-knows-what torture connected to a robotic surgeon, and even that medgeek, Pinkerton, back in Borealopolis. Nanoannie's future sister-in-law was *not* going to die.

Had the Facers shipped her back to Mars?

Maybe they made her into a corpsellite, orbiting Mars with a lot of other discarded baggage.

Most likely they'd use Kapera to lure her parents, and shanghai the whole Smythe family into the Yggdrasil trek.

She drifted around the cabin, feeling pathetic and noble.

This was her wedding night. But where was her bridegroom? The groom should have been Sekou Smythe. Her blood raced thinking about him. Even if they were to be frozen for a hundred thousand mears, at least they'd be frozen together. And who knows: maybe they'd wake up on a new world, the first humans in another star system.

No fancy psychedelia clubs. No trendy clothes from Earth. No new Nausicaa Azrael thrillers, unless she wrote them herself.

Yeah, maybe she'd be the Nausicaa Azrael of the new world.

But not without Sekou!

The door unlocked.

A new nun. Nanoannie was getting tired of women with blown-up stomachs and funny bumps on their fore-

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heads.

"What now?" Nanoannie hissed. "You got somebody else you want to marry me to? So you can murder him, too?"

"No, dear child. We're having an orientation meeting on main deck and all must attend." She cringed. "Will restraints be necessary, or will you come peaceably?"

"What is this orientation about?"

"First tell me if I have to collar you."

Shock collar? Smuggled from Earth, or was some evil corp manufacturing them again?

Nanoannie squared her shoulders. "I'll come. I'm curious." As to Crystal Spirit's next cuy-brained idea.

The orientation deck was jammed. You were forced to let people press into your lap, while you pushed your butt against the person behind you, which is Nanoannie's case was a pudgy guy with a rock in his pants.

Nuns lined people up, facing them all the same way, as if there was gravity, so they could all see.

Nanoannie liked smells, particularly people smells, but this was way too much. The woman in front of her had a sweetish smell like a leaky sanitary pack. One of the guys behind her smelled of sex, an odor she knew from her parents' laundry. Somebody reeked of cheap Borealopolis perfume.

The room went dark and a holo started up: rehashed stuff about the Face, its discovery, attempts to discredit it, and the founding of Cydonia. Then some guy yelled at them to go populate the universe. Mars and Luna were first steps, but we have to get out there and do some serious inseminating, and right now, fans.

See, funding from Earthbound Facers might dry up, or the political climate on Earth might cut further support.

But nothing about Yggdrasil, or how they would be frozen, or thawed out.

Would it be done by machines? Would the Builders revive them, once they got to Yggdrasil? What if it had all been a mistake, and there were no Builders?

Management here had forgotten that humans need to breathe, and Nanoannie started feeling woozy. Added to this, she hadn't slept in a long time.

She was dozing when the lights came back on. People squirmed to get free, while nuns screamed and threatened them with zappers. One man broke loose and floated above them, then windmilled around to catch a handhold and move toward an exit. Dodging his kicks, she smelled his stinky feet.

When she looked down again, she saw a Kiafrican guy about her age, and thought she recognized him.

People were muttering and wailing—maybe hurt in the confusion. So Nanoannie bellowed over the noise, "Sekou! Sekou Smythe!"

He didn't hear her.

"You! You in the red suit-liner!"

Several guys stopped wrestling their neighbors and looked in her direction, including the thin Kiafrican guy.

The guy spotted her and elbowed through the squirming throng. "I know you! You're the girl pilot with that boss hybrid plane."

She backpedaled.

This guy had brought Kapera to the *Origami Firefly* at Cydonia. His name was what? Cayce. Yes, Cayce.

Chapter 30
Reunion

Space Station Home, *Summer-April 20, 2202:*

Dear Sekou,

Our daddy isn't tall, but that makes no nevermind in microgravity. Not on Mars, either, where people measure up by spirit, not centimeters. He's medium dark complected from our Kiafrican ancestors, with reddish overtones, from Native American blood, his eyes focus at a distance when he's listening. He has some ritual scars, but left Earth before he got the full set. From a New Jersey

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fraternal order, not done in Africa.

If you had been raised on Earth, would you have gone and got ritual scars? Mother harps on what a saint you were, but you must have had some hot blood, too.

I asked him about the Naguchis.

"Not so fast, sugar," he said. "What happened to you? We knew you lost your com, but Nanoannie's folks couldn't raise her or you."

I told him Nanoannie dodged her folks, because she swiped the plane. "What happened at the pharm?"

"You ran off just in time to miss some visitors. The Naguchis arrived first, two sols early because they'd bribed somebody in Immigration to let them out of quarantine early. Turns out somebody sweetened the pot so they could follow the Naguchis and check out our research."

"Daddy, which research was that?"

"Sugar, your mama was onto a hot line of inquiry—except *hot* is the wrong word—on how bacteria survive the cold of Mars. Millions of mears of cold."

"That's what the Facer Nuns want. So they can freeze people to take to Yggdrasil."

"Yggdrasil? That what they call the planet? Understand, though, freezing and thawing bacteria is a long step from freezing and thawing people. Science has been able since the twentieth century to lower human body temperature for crude heart surgery. But Mars ambient? Your mama could do it—with plants first, then chickens, then cuy."

I asked, "Why do they want it so cold?"

"First, because then passengers use no energy during that long interstellar voyage. Second, have you heard of the Arrhenius Equation? Chemical reactions—and that's what decay is—are slowed in extreme cold."

"So why not just freeze them? Oh—because water expands, the cells bust open, right?"

"Your mama uses fluids called cryoprotectives, but more important, she uses gene therapy to introduce DNA from extremophiles—which we think originated on Mars."

"The ones with the bacteriorhodopsin?

"The ones your mama worked with may have mutated from Earth bacteria. But I don't think so. They were found under the polar ice cap. Your mama amazes me—I hope your intellect favor hers instead of mine."

"What do you mean? You're really smart!"

He smiled his sad smile. "But your mama has genius. Why I married her."

"For true?"

"No, sugar. That's a joke. She has compassion, courage, humor. Why we've survived on Mars."

"You were explaining."

"Anyway, she could chill mammals all the way to Mars ambient, even lower, without burst cells. And Vivocrypt, our old contract holder, lusted after this new work."

"Because they wanted to sell the system to the Facers."

"Right. But see the problem?"

"Thawing them out. Waking them up."

"You did inherit your mama's brains. You remember about heat-shock proteins?"

"They help living things adjust to high temperature."

"Right. If you have a frozen organism—say Mars ambient or below—and you heat it up—bang."

"Heat-shock protein could help the animals live through such a humongous rise?"

"Right."

"Mmm-m-mm! So the Renegade Nuns wanted that information from you. How did Mother get interested in this in the first place?"

"Why else freeze people? In the twentieth century, dying people had their heads frozen, hoping to be thawed when a cure for their disease was discovered."

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"Say what? She was planning to experiment on—me?"

He closed his eyes, then looked into the distance, at Mars turning under us. "She started the research before your diagnosis. Her research might help others. Childhood cancer is common on Mars."

"She wanted to freeze me."

"Sugar, the research was not ready for that. That's why we sold the pharm to go to Earth Orbitals, where they have effective treatment. She was working for all the children of Mars."

I went to his open arms. "Daddy, the Renegade Facer Nuns want to freeze me, to take me to Yggdrasil. They think the Builders will cure me."

He squeezed me. "Commendable, but misguided. We have to stop them."

Suddenly I thought of something. "Where's Mother? Where have you been all this time?"

"The invaders had projectile weapons. They demanded our new lab notes. Your mama refused. So they grabbed the nearest human—"

My heart nearly stopped. "My mother?"

"No, thank Mars and stars. Your mama was not expendable. They grabbed the nearest humans, who happened to be right there, the ones they followed to the pharm."

"The Naguchis. But they aren't dead, for true?"

"Let's hope, Kapera. Let's devoutly hope."

I watched Mars turn under us, wondering could I see our own patch. I didn't know which kind of orbit we were in.

"When your mama refused to revive them—because she feared it would kill them—the invaders went wild, ransacked everything. Maybe they hoped to find her notes, or frighten us into surrendering them."

"So that's why you called and said not to come back."

"Yes. Because with you there, I don't think they would have frozen the Naguchis."

I got a sick feeling, and not just from microgravity.

He looked at me steadily. "They would have frozen you."

Chapter 31
Friend of Widow Bride

Nanoannie stared.

Cayce was wearing a casual red jumpsuit and a Face bindi. He was a Facer, but which side? Sphynxeye's successors, or Renegades? Could she tell by sniffing him?

"Hey, hamster! Totally nuke seeing you here. How did you like those sandwiches? How's Kapera?"

Nanoannie couldn't pretend not to know him. She'd play it by ear. His Face bindi didn't stick out way much, just looked like a realistic tattoo. Maybe that meant he wasn't deep into the Facer thing. "Kapera is sick. They took her away, I don't know where." Maybe she could use her babehood on him. He was young enough to have super strong hormones.

"Hey, sorry about that. Maybe they'll send her back to Mars. She was a numb little mole rat, but I kind of liked her." Cayce dodged a kick by somebody struggling toward the exit.

Was Cayce a "volunteer" who hadn't really volunteered? Or one of the guards? She licked her lips. "So when do we start our voyage?"

"Oh, that. Well, first we mate the hab and propulsion modules. That should be pretty quick. The Vivocrypt subcontractors had it ready to go. Then we do the cryo thing."

She repressed a shudder. "And that will be when?"

Cayce looked around at the chaos of bodies attempting to find friends, or maybe escape from new spouses. "When they get the final info on the cryosleep."

"I—thought they just kind of froze us."

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"First they do the perfusion. Then the virus to make the cells radiation-hard. Then low temp, to slow chemical changes. But I've been thinking. Suppose they don't do it right. They can't be sure the revival process will work."

"So what do you think they'll do?"

Cayce shrugged. "Probably freeze us anyway and hope the Builders can unfreeze us."

Cayce was a little shorter than Nanoannie, but in microgravity she could look him in the eye. What did he really think of all this?

He grinned. "Live fast, die young."

Change the subject. "So, Cayce, who did you get to marry?"

He laughed a lip-curling laugh. "I was lucky. I knew my bride from before. She's a seven mear old whose parents were part of the Sleeper party."

"Seven mears is kind of young." A whole mear younger than Nanoannie herself. "So, do you like her?"

"Mars, she's this stupid little molegeek without an gram of education. Phobic about my lizards—and white!"

"You only like Kiafrican girls?"

"I didn't mean that. It's just, no common interests, no chemistry. They only matched us up because we'd met once and we're the right ages. Khalida's not even from Cydonia. She grew up in a pharm south of Cydonia. A convert."

"Will anybody actually get pregnant at this rate?"

"You don't understand the Dialectic of the Face. If you're selected to go to Yggdrasil, you can't be fussy. For humanity's future in the stars."

"The Human Diaspora."

"So you know the drill?"

A puffy-faced old nun came toward then. Her Face bindi was all worked up, and so was she. "You need to be in your cabins!"

Nanoannie drew herself to her full height, then realized she was floating perpendicular to the nun. "I am the widow of Elvis Darcy. Surely as a new widow, I deserve to be cut some slack."

"And I'm E. Cayce Jones," said Cayce. "One of the People, not some idiot Utopian the nuns dragged along."

The old lady rolled her eyes. "You still need to be in your cabins."

Cayce said, "My cabin is being used by other newlyweds, thank you mucho."

The woman gave up and floated away to badger others.

Cayce said. "Elvis Darcy, huh. Nuklear."

"So your bride is just nobody?"

"Actually, I lucked out. Khalida inherited big bucks from some Facer aunt of hers on Earth. She was so glad that somebody in the family got religion that she disinherited everybody else."

"You think if something happened to Khalida—"

"Mars. Don't talk like that."

"I'm in cabin Freyr 0405. I don't have a com, do you?"

"Yeah." He started to beam her his address, then realized what she had just said. So he scraped a microscale off his collar. She held out her wrist, where he stuck it until she could find herself a com.

Was he giving off pheromones when he put it on her wrist? But she was no longer interested him. She had another idea.

"See you later." She used his shoulder to push off.

Not used to microgravity, she had to wait to bounce off the ceiling before she was traveling toward the old nun who had harassed them. She collided with the nun with some force.

The nun's Face bindi bared its tiny teeth in rage. The nun said, "Watch yourself, young pup!"

Nanoannie ignored that. "Listen, I need to talk to that Crystal Spirit person."

"Who are you to be demanding audience with our leader?"

Nanoannie gave an exaggerated sigh. "I just remembered something about Kapera and the Hyper-K. I refuse to tell

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anybody except Crystal Spirit."

The Nun's Face bindi rolled its eyes up as if gagging. "If you are really Elvis Darcy's widow—"

"And Kapera Smythe's best friend. I *know* things."

After about a zillion mears of floating in a reception zone, Nanoannie confronted Crystal Spirit and her Face bindi, gazing at her with feline serenity.

"Child," said Crystal Spirit. She took Nanoannie's head between her hands, closed her eyes, and moved her lips. Her Face bindi mimicked her prayerful expression. "I see you are deep in sorrow for your departed husband. Believe that he died thinking of you. At the Omega Point, his body and soul will be restored to you."

"You don't believe that crap," said Nanoannie.

Crystal Spirit let go of Nanoannie's head and looked at her, cagily. "I am One with the People of the Face. Some of us believe in the Omega Point and some don't, but I see you have no faith at all to palliate your grief."

"I meant, you don't believe I'm mourning for Elvis Darcy." Nanoannie pushed away from her angrily. "I'm waiting for a different guy, who's a lot more nuklear than that old fart." She took a breath. "But you still recognize the marriage between me and Elvis Darcy, right?"

Crystal Spirit tucked her voluminous robe around her legs, where it immediately started coming loose again. "Yes. And you have a right to another bridegroom, who at this very moment is being selected, unless you have a preference."

"I keep telling you. Sekou Smythe."

"Kapera Smythe's brother is not aboard the *Chrysalis*. Pick somebody else, or the social director will match you up. Men outnumber women, as you've heard, as in the population of Mars."

Sure. Earth liked to send its trouble far away. And trouble frequently was caused by excess testosterone.

"However, in your age group, my dear, the difference evens out."

"Who cares? I didn't come here for another husband."

"You'll get one anyway. It's for the best. You'll understand in the long run. Did you not learn to love Elvis Darcy in the brief hours you were wed to him?"

"No, actually not. But I do want his personal effects."

A shadow flickered over Crystal Spirit's face, and her Face bindi woke up for a minute, then closed its eyes like a cat. "He had no personal effects."

"Cuy crap. He had a com and a puter rig. I saw him fingertipping." She took a breath. "And I want the other stuff he had with him."

Crystal Spirit laced her fingers together. "Mmm. That thermos Kapera Smythe was lugging around?"

Nanoannie nodded, surprised Crystal Spirit saw through her so easily.

"What gives you the idea he had that thermos?"

"It wasn't with Kapera. I think his corpgeeks stole it from her."

Did the Face bindis mirror the wearer's state of mind? Crystal Spirit's bindi broadened its seraphic smile. "And why should we give you the thermos?"

"I didn't say the thermos specifically. I want all his stuff. I'm his widow and I want it. Unless you vented it after you vented him."

"Maybe we did. Tell me, child. What gives you the gall to make demands? I'm coordinating this entire mission. Though I succor the sick and unfortunate, my personal resources are limited. Many others are in need of my guidance and compassion. Why should you be worthy of special consideration?"

"I have information about this deep freeze business."

Nanoannie could swear the Face bindi popped its eyes. Crystal Spirit, apparently aware of its treachery, jerked her hood down to cover her forehead. "You

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suggested that to Compassionate Symphony. What could an innocent soul like you know?"

"That you don't know how to wake people up from the cryosleep."

"Where did you get that idea?"

"It's true, isn't it?"

"Of course not."

"If you give me the thermos, maybe I can help."

Crystal Spirit suddenly went global. "There is nothing in that thermos. We did a complete analysis of all components—and I admit there were several we hadn't seen before—and none had the slightest usefulness to us. Except, of course, that the caffeine content, and some novel red-cell enhancement catalysts, did have a slight restorative power on Kapera, specifically on her blood count. I suppose it might have medical applications."

Nanoannie blinked. The Hyper-K *had* to hold some sort of secret.

"Our undercover agents in the Utopia laboratories couldn't find anything, either." She spoke into her com. "Would somebody bundle up the mess from Soyuzoid 435 and bring it to my office?"

She focused on Nanoannie again. "I'd be careful drinking the stuff in that thermos. Your little friend most likely murdered Doctor Sphynxeye, and her background as an understudy of the Smythes makes her a perfect candidate for untraceable poisons."

Nanoannie shuddered. Her own suspicion that Crystal Spirit was involved in the assassination of Sphynxeye, grew. She had the perfect motive, after all. She was an undercover agent for the Renegade Nuns, who wanted to send their own mission to Yggdrasil, and now, not later.

Putting suspicion on Kapera was just so self-serving.

Crystal Spirit's lips tightened. "You think I did it, didn't you?"

Nanoannie caught her breath.

Crystal Spirit pulled her hood back, revealing her Face bindi, which was contorted in an expression of grief. "Dr. Sphynxeye was a man of liberal passion and bountiful sexual appetites," Crystal Spirit continued. "He had many women, all of whom respected his need to express affection."

"You were his lover?" Nanoannie asked. She was trying to envision old Sphynxeye as a stud. She was getting used to the idea of a lot of unlikely people having hot pants.

"Hardly." Crystal Spirit pulled the hood back up. "I was his daughter."

The cabin, when her escort returned her, was empty. She sniffed the air for sexual smells, but she detected only a whiff of somebody's deodorant.

The *Chrysalis* was such a *benign* prison.

Except for the bugs. Except for the fact that you couldn't go home. Except for what had happened to Elvis Darcy and maybe Kapera.

She unwrapped the bundle they had given her, hoping for Darcy's com or personal puter. No such luck. A wallet containing smart cards from Utopia and some other companies, a heart-shaped coin on a gold chain, a uniform, which had apparently been cleaned despite other economies on the *Chrysalis*. But faded stains persisted. Blood. Elvis Darcy's blood.

And the thermos.

What if the microdisk really *was* embedded inside the vacuum chamber?

She'd have to break the thermos to find it. Pieces of glass would float around the room. She'd never find the microdisk itself.

If it was a microdisk.

Had Kapera given her a clue? Nanoannie unscrewed the thermos and wrinkled her nose at the rotten fruit smell.

Was Kapera what she seemed to be? She looked like a sick little kid, with leukemia. But maybe she was sick because of something to do with the cryo revival secret. Or maybe she was just pretending to be sick, in league with her

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parents to help one side or another. The conservative Sphynxeye faction? If so, she had no motive to kill Sphynxeye. The Renegade Nuns? That made more sense. But if so, why didn't Kapera give them the secret of the cold sleep revival?

Nanoannie swung the bottle in a gentle arc, and the liquid crawled to the lip. She looked around. The room was bugged, galactic-size. The Nuns were hoping she'd find the secret.

She slid her index finger into the bottle, and the amber fluid coated the tip.

Should she touch it to her tongue?

Someone tapped at the door. Ooee, perhaps, come back to see if she could destroy somebody else's life?

"Who?" she demanded.

"It's me. I just—wanted somebody to talk to."

Cayce?

She screwed the cap back on the thermos and stuffed it under the tethered blanket of her bunk. It bobbed under the covers. "Come in."

Cayce burst in, looking agitated. "Listen, I just learned something terrible, and it's put a galactic-size guilt trip on me."

"*What have you done?*"

"It's Khalida. She—" He tore his Face bindi off and threw it across the room. It stuck to a wall and mugged as if nauseated. Nanoannie had never seen somebody take their Face bindi off. She assumed they were wired in and had to be removed with a scalpel.

"Khalida doesn't like you?"

"No. She's—oh, Phobos and eternal cold. You've probably guessed, they don't have the manpower to supervise all of us. Khalida stumbled on a group of Sphynxeye followers trying to escape in a soyuzoid. She promised not to tell, but the Sphynxeye followers attacked. Khalida—"

"Go ahead," she said, trying to be kind. Had he loved Khalida after all? Stranger things happened. Maybe he'd gotten attached to her in their short marriage. Things like that transpired in Nausicaa Azrael thrillers, but in real life? The only romance she knew about was her parents', and her parents were about as dramatic as a dust sandwich.

Cayce struggled for control. "They tried to pull her into the soyuzoid, but Khalida was caught in the airlock, and—" He buried his face in his hands and his shoulders quivered.

"I thought you didn't care about her."

He turned his stricken face on her. "She was my *friend*. And I feel terrible that I wasn't a husband to her. If I'd stayed with her, none of this would have happened. No, no, I didn't *desire* her, not the way—oh, Nanoannie, please, I need somebody to hold me."

She floated inertly while he clutched her, his face wet against her neck. She thought, *it would feel like this to have Sekou hold me.* Reluctantly, she put her arms around him and patted his back.

"So alone," he whispered. "I need a friend."

His body felt warm and sinewy, entirely different from the embraces she'd felt on virtual dates. His skin smelled clean and spicy, from soap or Earth cologne.

She felt moisture in her sex, and jerked away from him. What was going on? She only wanted Sekou.

His eyes radiated fathomless pain.

She patted him and pulled him back into her arms, feeling the tingle of sweetness, down there. Oh Mars, Mars, Mars. Where was this going?

He pulled away slightly and wiped his nose on his sleeve. Tears broke free from his eyes and floated in fat globules. She thought, *If I'm not careful I'll inhale his tears.*

He said, "I'm sorry. It's just, she was such an innocent. It's my fault. I didn't love her. And now it's too late."

He looked a little like Sekou, except that her image of Sekou was high energy, not all sad. She thought of the holo of Sekou. *But first I have to find my folks.*

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"It's all right," she said. But it wasn't. She felt unfaithful. Suddenly she wanted Cayce out of her cabin, off the *Chrysalis*, out of her life.

Chapter 32
Where They Were

Space Station Home, *later:*

Dear Sekou,

Sorry, bro. I got myself back under control now.

"You have to know. These people are killers." Dad gave me a worn-through old hanky to blow my nose and mop up my tears.

"So where's dear Mother? Hiding out while you face the freeze?"

"You never forgave your mama for mourning Sekou so, did you? But you know, it was grieving, not loving him more than she did you." He squeezed my hand. "You mama's our trump card. They never found what they wanted. We hid the copies. Microdisks. But they didn't find a single one. So provoked, they destroyed the place."

"That was why there was radioactivity? We thought they bashed on the nuke."

"They did sabotage the nuke. Stars, sugar, you didn't need radiation, too."

"Oh, we weren't there long." I started crying again. "Nanoannie and I found the Naguchis buried out back. They looked super dead."

"What about their faces? Was there sky-bite or bruising?"

"No."

He thought a long time. "Then they must have done it correctly, not burst cell membranes. The revival process is just as exacting."

I got curious. "How does it work?"

"Only your mama has the exact protocol, sugar. The regimen has to be calibrated to each subject, based on weight, brain size, basal metabolism, endocrine profile—a host of parameters."

"Can they do it on a mass scale, to a whole shipload of people?"

"Might could be. Would require some serious training for the practitioners. And then the practitioners would still be awake. And who would do the revival? Whoever froze the passengers would have to return to Mars. Or live their lives on the *Chrysalis*, then die in deep space, thousands of mears from journey's end." He snorted. "Were it me, I would pack a big library."

"Does it *hurt*?"

His expression grew grim. "Girl, you are already scarred by sorrow. What happened to the Naguchis—"

"Daddy, the people of Mars should know. Use my wrist puter. Tell the story. You may not get another chance."

"Some things a child should not hear." His eyes glistened. "Put your helmet back on and promise me you'll never access this post."

I swallowed. "I saw them lying in the ground, Daddy. I'll imagine worse things if I don't hear the truth."

Sekou, this is what our father told me.

Marcus Smythe, his account of events at Smythe Pharm and Laboratories, Dateline Summer-April 20, 2202.

Recorded for all Mars, as soon as my daughter and I can make it public.

The Naguchis arrived in advance of their payment for the pharm. They'd signed with Utopia Limited; Vivocrypt wanted research more radical than they could undertake.

These two petite new Martians, all starry eyed if scared, babbled about wide-open spaces, solar arrays, frostflowers. They'd been trained to live in a Mars hab, but they were so *enthusiastic*, wearing crispy-new blue environment suits, with bells and whistles the salesbot must have pushed on them, most useless.

Your mama asked, "Did you see our daughter out there?"

Kiku Naguchi said, "Daughter? No, nobody out there."

"Father Mars and little stars!" your mama said. She ran back upstairs and

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saw the rover was gone. She hit high Mars orbit, worried you'd run aground or get lost. When you've had her losses, you get overprotective. I'm more optimistic about you, sugar. You're a survivor.

Turns out you were safer for having run off.

I was trying to calm her down when we noticed a bigger rover, painted in butterscotch camo, pull up behind the Naguchi's.

Our first thought was, here's Intercorp Police bringing you home, with a ticket from some corp. When we saw the three camo suits marching toward the hab, we knew something worse was wrong.

They brushed the Naguchis aside.

"Ma'am, sir, we've come for the revival protocol," said the big one. His pocket emblem had no name, but he was tall and had pale, empty eyes and little ears that looked like broken wings.

"It's not ready," your mama said. "The agent from Vivocrypt agreed to suspend that research until we return to Mars."

"That'll be a little late, ma'am," the big guy said.

"We've been through all this. The cryo protocols are experimental, never tried on humans, and animal subjects are responding with mixed success."

"Mixed success, ma'am?" The *ma'am* stuff was working on my nerves.

"Not all wake up." Your mama's eyes glared like lasers.

"May we assume your records are somewhere in this pharm?"

One of the others was a woman with a single yellow scleral implant, probably a bio-sensor, which clashed with her other, blue eye. She and the other man had the gall to be poking through specimens. She tried the airlock to the high pressure greenhouse.

"Of course. But the data are incomplete."

I blocked the smaller guy from an aisle of tables. "Excuse me, Martial. Who do you represent? "

I was thinking, *Are they armed?* I was also fingertipping on my com, trying to contact Intercorp Police—they're fairly useless, but I couldn't think of anybody else.

"You're out of line, Martial Smythe. You've sold this pharm and everything in it. That includes the data in question."

"But we didn't sell it to *you*," I said. By this time, I'd discovered something—maybe a satellite glitch—had jammed all com traffic.

The big guy swiveled to Kiku Naguchi and said, "Martialle Naguchi, ask this gentleman to release his notes. He thinks we need *your* permission."

Kiku Naguchi straightened. "Our contract is with Utopia Limited. We answer only to them."

She hadn't glommed onto the kicker in pan-Martian law. It theoretically protects property rights of even the lowliest hire, but the key term is *theoretically*. And that's when the projectile weapon appeared in Big Guy's hand.

The woman pushed past your mama, leaving the airlock open on our side. Swallowing my rage, I closed it. She was ransacking our laboratory.

The big guy was implacable. "Whoever owns it, we need it, now."

Ken Naguchi grabbed his wife's hand, and they bolted into the airlock together. The Naguchis were compact people, but something—maybe a loose strap from one of their suits—hung up in the airlock, and it jammed.

The smaller man—wide eyes and tiny chin made him favor a gussied-up tilapia—seized Kiku Naguchi. She bashed her helmet against his chest, Kapera; she fought like a wildcat.

The Naguchis must have known some Asian fighting moves, because they were giving as good as they got.

Then the projectile weapon went off. It didn't make much noise in the low pressure, just a pop, as if we were clearing our ears, but shards of ceramic rained from the hanging garden. And Ken Naguchi grabbed his arm. Must

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have grazed his sleeve and breached the suit. Good new suit, but all it could do was to seal off at the shoulder.

Tilapia-face put a gun to Kiku's helmet.

"What do you want?" I asked.

"Much better," said the big guy. "we want the complete notes."

Your mama was livid. "The protocol will kill at least half of the subjects. Humans are more vulnerable than test animals."

She told true. Human brains need more oxygen. And chilling a large animal such as a human all at once, the core no warmer than the extremities, is tricky.

The odd-eyed woman emerged, brandishing a bottle. "Found it. Let's tango."

I thought they'd leave, and we'd catch our flight to the Down Escalator. I felt bad about leaving the Naguchis with this mess, but since they knew nothing, they'd be safe.

"She's got a cold-room setup," said the woman. "Bring the whole gang and we'll go to town."

"You're my babaloo," said Big Guy. Gun trained on my helmet, he waved us ahead.

In our cold-room, Big Guy made the Naguchis remove their suits. They resisted until he ventilated Kiku Naguchi's boot.

They forced the Naguchis to lie down on a table in their suit liners. Kiku was bleeding.

"Why are you doing this?" Kiku asked. "We know nothing."

"Shut up," said Big Guy. He held the projectile weapon on me and your mama while the other two strapped the Naguchis down.

I felt like a coward, sugar. I should stop this, but how? Something blocked my nine-eleven. I told the Naguchis, "I'm sorry."

Defiance flickered in Ken's eyes. He said something in Japanese, but the invaders had taken his com with his translator. Kiku Naguchi's heartbreaking gaze told me his peril hurt her more than her own injury.

The room was pressurized, so the invaders took off their helmets and gloves. Their breath was mist in the thin, dry air.

I sensed your mama had the same thought I did; if we got a chance, we could purge the atmosphere in the room and run for it.

Except we couldn't. The Naguchis would perish.

Your mama removed her helmet. I saw her point. If we kept our helmets on, the invaders might guess our plan. I unlatched my helmet.

The odd-eyed woman scrolled through your mama's notes. "Won't be hard. Let's assume that the treatment scales with volume. We need to cool them internally, though."

I prayed she wouldn't find it, but she did: coolant, enough to infuse the two adult humans.

Your mama cried out, "Please! We anesthetize even animals!"

Big Guy swaggered over to her. "We're short on time. Give us the rest of the process and we'll stop."

Your mama is terrifying when she's angry—and she was angrier than you ever saw her. "It is not complete!"

"Then we'll proceed." We watched in horror.

The Naguchis never whimpered, but tears trickled from their eyes. Your mama screamed, "I'll give you everything I have!"

But Big Guy shoved her into the observation room next door.

I saw my chance and kicked at his gun hand. I missed, and he aimed the gun at your mama's head.

"You." He tossed her a roll of duct tape. "Bind your husband's hands. Don't cheat."

Eyes corrosive with hatred, she taped my hands. Loosely, of course. He would know that, but it would stop me. He lay the gun on the table, where he could

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reach it fast, and bound her hands. Then he got mine again, much tighter.

An airlock separated the cold room from the observation room. He cracked the seal on the cold room side, so our side wouldn't open.

"They'll kill the Naguchis," I said to her. I've seen stone coldness in a man's eyes, when I was in service on Earth, and this was it.

"Maybe not. That woman with the yellow eye implant seems to know the procedure. We did share early results with Vivocrypt corpgeeks." She was breathing heavily, scared and angry.

"You really don't have the revival procedure."

"Only a preliminary protocol. But they think I'm holding back." She bit her lip to check her own tears.

Through the window I saw the Naguchis struggling against the restraints. The tears on their faces had frozen, and the three invaders were lowering them into the ice bath.

"The awful thing is, they might find my notes." Her voice was soft and fearful.

I knew that. She hadn't uploaded them to any scientific site on Marsnet, though. She wanted to perfect the revival process first.

The Naguchis quit struggling. Their bodies infused with coolant, they were comatose now. Thank the stars.

"I was fooling myself," your mama said. "The cooling process and the dosages need to be so carefully calibrated—they've killed them."

"Maybe not."

"Ever the optimist. But will they kill us now?"

"No. They think you're holding back information." I hated saying that, hated putting the pressure back on her, but it was true.

The invaders dressed the Naguchis in environment suits and dragged them out.

They came back for us. Big, beastly, menacing people clogging our doorways.

"The revival process," said Big Guy.

"If my hands were free, I could show you." But they dragged her, still bound and gritting her teeth to keep back tears, into the cold-room.

My com came alive. Still wouldn't reach the net, but I managed a warning to you. Sugar, I'm so thankful you heard me. All this time, and we didn't know you were safe until just now.

Now I felt crazy that your mama and I were separated and still bound. What were they doing to her? I struggled to loosen the tape.

I tried to contact your mama, com to com. Nothing. I hoped desperately she heard but didn't want to tip our hand.

I feared they'd freeze me next, hoping to squeeze out of your mama a secret she didn't have.

Big Guy came back. He pushed me through the cold room. Blood smeared the disconnected lines and I tried not to think of the agony the Naguchis suffered before the cold took them. At gunpoint, he ushered me through the airlocks toward the low pressure greenhouse. What we could do now? Our helmets were on the floor of the cold-room, where we'd dropped them during the struggle.

I feared what they intended—the smaller man was gathering up samples, flasks of enzymes, puter mods, and paper notebooks, indiscriminately. They'd take us to their home base, wherever it was, and torture your mama for the secret she didn't have.

I'd never let that happen. I'd stop them or die trying.

At the airlock between the medium and low pressure greenhouses, we both struggled to breathe. My peripheral vision was going, the first sign of anoxia.

"Courage, Marcus," she gasped. Showed the spirit that made me love her.

They were smashing things. Laid the Naguchis on the floor of the greenhouse and ripped pipes from the walls to bash

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our equipment.

I tried to nine-eleven again. No luck.

We waited, helpless, while they rampaged through the pharm and hab methodically, clubbing, smashing, shooting.

All this time, we labored to stay conscious, wondering when the low pressure would get to us and we'd sink to the cold ground.

They destroyed everything. Even, finally, the seals on the nuke.

The radiation wouldn't be lethal, but it would destroy organic computer data, and the puters themselves. So much operates on puters, life support started going bad quickly.

You say you weren't in the hab long, you and Nanoannie? Well and good.

Lights went out. They shot out the transparent panels in the greenhouses. Glass shards showered the Naguchis' defenseless bodies. Shattered pieces of jury-rigged cold frames for your little harmless experiments. That hit me hard, I don't know why.

The tilapia-faced man dragged the Naguchis outdoors and that's the last I saw them. You saw a burial cairn? Best now not to disturb them. Warming them would be fatal, so let's hope they aren't found.

The trashing crescendoed—furniture pried apart, pipes smashed, fluids spurting out, then freezing or going up in a ice-crystal geysers.

I need some water. Stop recording for a minute.

I'm back. Sorry, it's hard to record this, the threat to our lives, the end of our dreams.

Anyway.

The nuke seal was breached, so these fluids were hot. Hot ice crystals tried to invade our lungs—we tried not to breathe, tried to think how to get to spare helmets.

I nearly went psychotic, Kapera. Your mama says she bore up by imagining revenge. She's not so noble when it comes to those who hurt her family.

I was watching, gasping in air that was way too thin. My lungs hurt, I worried that your mother's old pneumonia lesions would flare up.

Then I felt vibrations—call it hoodoo. Maybe you inherited it from me. I looked up, and streaking toward us through the spring dusk was a single red Marsplane.

The three invaders, busy burying the Naguchis, noticed it later than I did.

The three of them ran for their rover, jumped in, and zoomed away, kicking up rooster tails of dust.

The red Marsplane was headed straight at us, low enough to take off the top of the low pressure greenhouse.

And they were shooting—kicking up puffs of dust, close by us.

Joy? Terror? My emotions strobed back and forth, my mind almost snapping between hope and horror.

"Run," your mama said.

Talking was a struggle. "Maybe they've come to help us."

But had they? Not Intercorp Police. Nor missionaries. Who, then?

We got our answer. After the camo rover had sped away, the red Marsplane buzzed the pharm once more, still firing.

We ran, stumbling on legs starved for oxygen, lungs heaving. On the way through the greenhouse, I noticed something at the center of my tunnel vision. Ken Naguchi's com. I snatched it up.

We had only seconds. Your mama read my mind: we had to get to the Naguchi's rover, through ambient. Skybite blistered our naked skin. I felt our eyelids and lips swell up fit to burst.

If this com didn't open the Naguchi's rover, we were dead.

It did. Thank stars it was the same make as ours. Easy to pressurize.

I drove it screaming, heedless of direction, away from the pharm, hoping the red Marsplane wouldn't see us.

For the first time, I thanked Mars for a dust storm.

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The Marsplane lost us. Thank each and every star, they lost us.

We found a band of Land Ethic Nomads two sols after that—about the time we were running out of consumables—and we've been on the run ever since. We hid, until I knew they had you, that it was not some trap, that it was really you.

Really you, Kapera. I never thanked the stars for escaping from Smythe Pharm as much as I did for bringing you back to me.

Now, the Renegades want your mama. She doesn't have what they want. Nobody has it.

Chapter 33
Nordupol

The cabin's bath facilities weren't luxurious: swabs reeking of some antiseptic, basically. Nanoannie really wanted a long hot tub bath, like in her family hab.

She felt dirty, getting all hot and bothered because a *Facer* guy touched her.

Cayce's Face bindi had stuck to the wall. She peeled it off and, swallowing revulsion, slapped it on her own forehead. Maybe she could pass as a Facer.

Moist, gummy. Disgust and excitement engorged her throat. She flicked it away, but it stuck to her finger. She pocketed it and wiped her hand on her sleeve.

Could she take advantage of the chaos on the *Chrysalis*? Something was going on. Getting ready for some big deal, they seemed to be getting lax about computer-locked doors and security checks. Maybe they didn't have enough guards to keep order.

Or maybe everything had gone to shit. If only she had pumped Cayce for more information. Were they in orbit? Had the hab mated to the propulsion module?

And when would they be frozen? How much time did she have to escape?

And what about Kapera? Poor little hab-rat. The best friend she had.

She couldn't leave the *Chrysalis* without Kapera.

A sweet mechanical voice broadcast: "Good news. Our shipment of refrigeration carapaces, manufactured by Vivocrypt, will shortly arrive. Do not be alarmed at the slight vibration when the transport vehicle docks with us. For your safety, please fasten bunk restraints."

Surgical carapaces, a shipment big enough to cause a "slight vibration" in the *Chrysalis*. Nanoannie shivered. The *Chrysalis* had to be huge. What size shipment would cause enough "vibration" to necessitate acceleration restraints?

The voice went on, "If you are away from your cabin, seek any available acceleration couch, or strap yourself to a wall. A belt will serve as a suitable tether. In case of injury, proceed—"

Being "tethered" sounded galactically inadequate. The nuns were really improvising.

Could she take advantage of the confusion? Or would she only get hurt?

She wrapped Elvis Darcy's stuff into a bundle, then eyed her bunk. Should she do as the sicky-sweet voice suggested?

She pushed on the cabin door. Locked again. Did some central system control the doors? Or had Cayce locked her in?

She reared her head back and screamed.

That *felt* good, but *did* no good. She had bought a one-way ticket for a hundred-thousand-mear trip to a planet that might be about as hospitable as Venus.

So she lay down on the bunk and fastened the restraints.

The door chirped.

Nanoannie reared up, only to be yanked down by the restraint. "Who?"

A long pause. Then, "My name is Nordupol Wanglee? I am assigned to this cabin?" He ended each statement with a question mark, as if not sure if his name really was Nordupol Wanglee.

"Come in, if you can. The lock has a

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mind of its own."

Nanoannie didn't bother to unbuckle herself. The guy sounded way too confused to attack her.

A stir of air wafted a faint bouquet something like her father's anti-UV cream. Coconut oil? Coconut trees did not grow in Mars habs, but the fragrance was cheap to synthesize.

"So what's your story?" she asked, soon as the cabin door closed.

"I was assigned. Here I am. No offense." A beige, sad-faced guy.

"No offense? Meaning you aren't assigned to nail my hand in holy matrimony?"

An embarrassed silence. "You are joking, I suppose? This translator doesn't do well with your language."

"Yes. I'm joking. Touch me and I'll rip your nose off."

"I should—leave this cabin and tie myself down in the gangway?"

She sighed. "Just—be polite."

"Ah, polite, I understand. You are Martialle Nanoannie Centime, bride of Elvis Darcy?"

"Widow of Elvis Darcy, thanks to our gung-ho hosts. They blew him out the airlock in his suit liner."

"Ah. I myself have not been assigned a new bride." He waved his hand. "I do not seek you as one."

She wondered about that. "What did you say your name was? Wanglee isn't a common name, is it?"

"Fairly common. You could call me Nordupol?"

"Nordupol. Related to Fox Wanglee who got blown up with Elvis Darcy?"

"No. But I myself am also what you call a corpgeek? I was kidnapped."

"From the launch area?"

"Yes. My wife was killed trying to escape, her helmet run over by a rover. An accident, they said." He went quiet. "I cannot convince myself she is gone. They are murderers." Then, "This room is bugged?"

"But of course."

"I don't care. They are murderers." He began to weep. "We were working on the project for the antimatter drive ship. My wife and I, that is." He struggled for control. "I am drugged. The nuns gave me pills of several colors. But they didn't work."

What should she say? "I—it wasn't a love match with me and Elvis Darcy."

"But you are his widow and heir."

The import of this statement hung in the air between them.

"Widow and heir," she said.

"If it hadn't been sabotaged, Utopia Limited would be running everything. It would have an escape plan for us."

She suddenly felt herself getting heavy—toward the head of the bunk. The upper wall of the cabin pulled at her, and she felt as if her empty stomach—when had she last eaten?—wanted to turn inside out. "You have any of those drugs they gave you?" she asked Nordupol.

"No. The nun just reached into the big pocket they have in those robes and pulled out a handful of pills. All colors and shapes. I swallowed them all at once."

The floor shifted, and Nanoannie felt herself slipping out of her restraints until she was squatting on the wall. Then it rotated, and she slid toward the other wall, standing on her head. Then they were floating again. "Do you know anything about astrogation?" she asked. "Are they coupling the hab module to the propulsion module now?"

"I don't know. I was on the team doing the initial study for the Utopia ship, the fast ship, which will never be built now."

"I'm a Marsplane pilot," she said, "and I've studied up on orbital maneuvers. The module that met us, if that's what happened, must have been super enormous. As big as we are, maybe."

Nordupol's breath sounded ragged. He was either scared or ready to spew those multicolored pills. Or maybe the nun had poisoned him. "It would contain many surgical carapaces. Enough to

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freeze all of us."

Nanoannie closed her eyes. She could feel the ship's vibration, a final maneuver, and she braced herself for more micro-g kweez. But it didn't come. "How will they load all those carapaces aboard?"

"This habitat, which we built—and which the Renegades adapted to mate with their slow ship—has a track loader with robotic arms to move materials into the cargo bays."

"And where did they get these carapaces so quickly?"

"M.A.L.C., I would imagine."

Nanoannie was afraid he would start crying again. He had a right to cry. His wife had died right in front of him. But Nanoannie, stressed out from her own losses, was tired of people's tragedies. "M.A.L.C. stands for—?"

He sounded annoyed, as if he wanted to go back to his drug-mediated anguish. "Manufacturing A La Carte. A system of duplicating machines by laser scan templates."

"Oh, M.O.D." Manufacturing on Demand. "Uh—Just how high up in the Utopia organization were you?"

"What? Not high up."

"Explain again how the corp was run."

"Utopia Limited was an AI, programmed by Elvis Darcy to maximize shareholder profit. We did what it told us, or we didn't get our indenture paid off. Or food, water, or air."

"Elvis Darcy said he didn't really didn't run the corp."

"Of course not."

"So why doesn't the corp try to get you guys back? It can't be profitable that the Renegade Nuns stole this module."

"Oh, credit was exchanged, all right. The shareholders made out just fine."

How could high finance be so complicated? "So the corp is just going to let all the corpgeeks get kidnapped and go to this scary planet twenty light years away?"

Nordupol hesitated. "It doesn't work like that."

"No? How can the corp make money for shareholders if all its corpgeeks were stolen? The nuns also kidnapped at least one shareholder. I saw her."

Nordupol paused. "The computer which hosts Utopia Limited was damaged during the Renegade nun raid."

"How do you know?"

"Several corpgeeks have been trying to contact it. Our coms are jammed, but some of us know how to rebuild the com network and get around the jam."

"And?"

"Utopia Limited does not answer. Blind, deaf, or utterly destroyed."

"But somebody must be in charge."

"Elvis Darcy, I suppose. The shareholders could elect a new C.E.O. But corpgeeks like us are helpless."

Nanoannie could hardly believe the thought that was forming in her mind. Intercorp law usually recognized lines of inheritance. A wife usually inherited from her husband.

She said, "I would be that C.E.O."

Nordupol came up against his restraints, bounced back down, and released his restraints. "Hm. You? An eight-mear-old adolescent?"

"Think about it, Nordupol Wanglee. It has attractive features." And why not? If she was to be Joan of Arc, why not a rich Joan of Arc?

Nordupol curled into fetal position in the open space. "You would take responsibility?"

"Find me as many Utopia Limited corpgeeks as you can." Then she remembered the bugs. *Talk loud, change the subject.* "But let's forget that. My friend Kapera—I told you about her? No? Well, anyway, uh, they grabbed her off the *Chrysalis*, and gee I'm worried. She's cute, but super immature. Uh. Did I tell you about her family?"

Nordupol tidied his bunk, spooling the tethers back in place. How could they circumvent the bugs to plot? Since she no longer had a com, his was translating for both of them. Morse code?

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You need a common language for that.

He held out a wrist puter. It displayed characters that looked like pretty bubbles, then flashed to recognizable words: MUTE PUTER FOR GAMES. HAS TRANSLATOR.

Nanoannie wriggled her fingers, as if keying. She had no way to input.

He flicked a telescoping stylus out of the side of the puter. He demonstrated it by sketching in the air, shielding the gesture between their bodies from surveillance.

She had to trust her clothing was clean from microscopic gestalt bugs. The bugging system was no doubt linked to low-level AI functions which would alert the Nun intelligence computer if they gestalted something suspicious.

THEY WILL NOTE SILENCE, Nordupol wrote.

"Nice weather," Nanoannie said. "No dust storms in space, huh? As Kapera says—"

He rolled his eyes. KISS ME, he wrote.

But he had promised not to come on to her. The letters in his language—Thai?—looked so romantic she wished he was Sekou.

PRETEND, he wrote.

"Oh, right."

"Your eyes are as bright as the twin moons, but both the same size," he said.

She giggled. "You are as strong as the gravity of a gas giant," she said.

He leaned over and touched her nose, flirting. Only a super stupid AI would think they'd start in like that. But as her mother used to say, *Computer Intelligence is a contradiction in terms.*

"I fall into your beauty like a meteor striking the plains of Noachis Basin." He wrote, I KNOW MOST CORPGEEKS. CAN USE GRAPEVINE. YOU LEAD ESCAPE.

"Whoa!" she said, and slapped away his hand, which had crept to her breast. Then she caught his hand and squeezed it, as if to apologize. ME? JUST HIRES' DAUGHTER. Still, just minutes ago, she'd been playing with power fantasies of being CEO of Utopia.

YOU PILOT? PILOT SOYUZOIDS.

NEED MANY CRAFT. And piloting a Marsplane was *not* like landing a space craft.

GET TO SURFACE. GET HELP. He leaned forward for another "kiss," although his lips were dry, closed, and unpuckered. She shivered—or was it a shudder?

She wrote, CAN'T LEAVE KAPERA.

He drew back and stroked her cheek. MAYBE GONE. MAYBE FOUND PARENTS. This all felt quite peculiar.

She made herself put her left arm around him. The coconut smell was delicious, and she wished, for the twentieth time, that he was Sekou. They wouldn't just be playing with his silly dumb puter if he was Sekou. THEY FOLLOW ME? TRULY?

He stroked her hair, which felt weird. JOAN OF ARC = YOU.

Leading an escape was a long way from her original thought, that she now owned a corp. Deep down, she was scared of things. Blood. Zloty's shitty diapers. Sand vampires. The dark environment where you can't hear Things Coming For You. Surgical carapaces. "Forget it, I won't marry you."

DIDN'T ASK, he wrote, then said, "My heart is riven in two, like the sides of Valles Marineris."

How suggestive! She giggled.

"Do not laugh at my love suit," he said.

GET SERIOUS, she wrote. Then, "I'm laughing because it's ridiculous. My heart can never belong to you. You imbecile."

"Take comfort in my arms," he murmured, and wrote DON'T OVERDO IT. Then, MUST ESCAPE. *CHRYSALIS* = DEATH SHIP.

"Never!" she said, and wrote, HOW GET OUT OF CABIN?

MEETING, 1 HOUR. "Let's take a nap," he said.

He seemed like a good man, with a good plan. But leave Kapera? For that matter, leave all the other people on the *Chrysalis*? She felt like a rat deserting a

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vented hab.

He wrote, AVERT SUSPICION. PRETEND CUDDLE. He took the stylus back, collapsed it, and tucked it away.

Her blanket was drifting. She grabbed it and made room for Nordupol, who was, thank stars, a small man.

Arranging herself primly, trying to look intimate, but touching as little as possible, she felt uncomfortable with this man she knew so little of, and yet who might hold the key to her survival. His coconut aroma wafted toward her. Sekou would wear something more sophisticated, or smell only of clean sweat.

She closed her eyes, too agitated to sleep. She had lost track of time and date, lacking her com.

Drowsy, her mind suddenly took hold of the possibilities. Grabbing his wrist, she tapped on the wrist puter. Blinking away his drowsiness, he gave her the stylus.

HOW MANY SOYUZOIDS?

MAYBE 60? 2 DESTROYED—ESCAPE ATTEMPTS.

"That's a lot. I keep underestimating the size of the *Chrysalis*."

He grinned. "Utopia Limited is the biggest spacecraft manufacturer in the Solar System, the greatest of all time. We were building the Facers an antimatter drive able to travel faster than anything of its size in the universe."

Then he did something she didn't expect. He took the stylus from her hand and, shielding it with the blanket, touched it to the bulkhead above their heads. It buzzed softly, and when he lifted the blanket away, she saw faint scratches in the metal.

CHRYSALIS MAP, he wrote. SHOWS WHERE SOYUZOIDS ETC.

She ran her fingers over the etched metal. The map was tiny, but her eyes were sharp, and so was her memory.

Sixty soyuzoids, each carrying seven people, meant four hundred twenty people could be rescued. How many people had been kidnapped? Were there enough pilots? She figured even Nordupol didn't know. But they would save everybody they could.

She watched him close his eyes. So, was it like this, to fall asleep with a man? But the man should be Sekou. Sekou was down on Mars. He had to be. He wasn't on the *Chrysalis*.

Unless he was on Earth. Maybe that's why Kapera hadn't introduced them.

He wasn't on the *Chrysalis*, so she was leaving and might as well take a couple hundred innocent victims with her.

But she couldn't leave Kapera.

Unless, of course, Kapera had actually murdered Sphynxeye.

But maybe Sphynxeye needed murdering.

Nah. Sphynxeye wanted to wait fifty mears until the Utopia Limited antimatter drive was ready. So why would Kapera kill him?

But how could she be sure?

Kapera might be into something super scary, but Kapera was still her friend.

And Sekou's sister.

Chapter 34
Ransom

Sacred Life Station, Summer-April 20:

Dear Sekou,

Daddy finished by saying, "We can't wait for justice. We need to get to the Down Escalator, to Earth Orbital Hospitals."

"But we've lost everything! The Naguchis will never to be able pay for the pharm."

He pulled me over to the observation ports. Mars rolled beneath us. A beautiful spring evening over Vastitas Borealis. "Sugar, life is more than things. More than real estate and comfortable habs. More even than those research results."

Our home! We kept it so tidy, spare, and pretty. I remember a bouquet of yellow yam blossoms on the polished duraceram table. I remember looking through the skylight in my bedroom,

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some stars blindingly bright, others fine as dust. An angel's jewelry box!

And those—Daddy called them *invaders*—made our home garbage, like a scar on Mars' fierce, wild, pure face.

And my dreams: would I ever climb Olympus Mons?

"Most things that seem important are only temporal." He took my hand. "Even our knowledge is not as important as survival."

I wiped away tears. *Survival.*

He continued, "I struck a bargain with the Nuns: give them all our revival protocol data, and they'll let me take you—"

"Where?"

He cut his gaze toward the bulkhead. "They've given us a shuttlecraft and pilot. They'll fetch your mama, then take us to the Down Escalator."

I wiped my nose, glad it wasn't bleeding again. "What about the Naguchis?"

He patted his breast pocket. "I have a microdisk here with voice-imprint testimony that Crystal Spirit and the People of the Face do not hold us responsible for what happened to Ken and Kiku Naguchi."

"They said I k—k—k—" I couldn't say it. It was too crazy.

He squeezed my hand.

I took a deep breath. "I didn't! I don't know who killed Doctor Sphynxeye. He seemed like a nice man, even if he was wacky."

He snorted. "No need to dwell on Facer craziness now. Any judge would laugh at that charge."

"They claim I poisoned him, gave him something that made him crazy."

"Poisoned? How?"

"Bio-weapons. They thought it was the Hyper-K. Then they decided the Hyper-K had the secret ingredient of the revival stuff."

He chuckled. "Let's go through that airlock when we come to it, girl."

In other words, he refused to consider it. "Okay. They *say* they'll take us to the Down Escalator. Do you trust them?"

He looked down. We couldn't see the north polar region anymore; it was night over the Tharsis chain. "They shook hands on this: we'll give them our notes only after they've set course to the Escalator."

"Suppose they change course."

He exhaled tiredly. "They'd have just enough fuel to get us to the Down Escalator and then get their pilot back to Home Station. I convinced them I know enough about astrogation to tell if they're truth-telling."

Another thing. If Mother didn't for true have the revival protocol worked out, would they be satisfied with just her notes?

Mars continued to roll beneath us.

"It will work." He was looking at Valles Marineris now, not at me, his eyes sad.

"Daddy, I'll keep on keeping on. For you."

"Another thing," he said. "Your little friend."

I smiled. "Dad, Nanoannie's taller than you are."

"In space everybody's the same height. Anyway, you think she's trying to help you. But are you sure she's not part of the problem?"

"What do you mean?"

"Think. She was so interested in finding you at Cydonia. Flew you to her family plantation. You were captured again, she escaped. Or said she escaped."

"She's my friend! She's just a girl, only eight mears old."

"And what is her motive for being so helpful? If indeed it was helpful for her to get you kidnapped from Plantation Centime, then taken up again from Utopia Headquarters."

"But she stole her family's plane, went with me to the pharm to help find out what happened!"

"There's another thing. Maybe she knew you'd gotten away free from Smythe Pharm, and for some reason somebody—who knows who?—wanted you somewhere else. Enter Nanoannie."

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"Daddy! She'd just a kid!"

"And your friend. But has she really helped you? And might she have an ulterior motive?"

I shook my head. "She even told me she'd let me pet her kitten."

"A kitten? Those people turn on the money faucet like it'll never run out. A cat from Earth?"

"And she was curious about Sekou. Heard about him because of the diary I keep on my wrist puter."

"Don't you think her interest in your wrist puter and your Hyper-K is suspicious?"

That put me in check.

"We need to rendezvous with your mama. They're lending us an interorbital shuttle. You'll have to put up with no gravity for a while more. But they claim their acceleration couches have good padding."

"I wish you could try my Hyper-K. It's boss for micro-g kweez."

"See, there's another thing, your Hyper-K. You and I know there's no secret in it—just a gift from your Mormonite Jesuit Samaritans—but why is Nanoannie so interested in it?"

That stumped me.

He answered for me. "Maybe she can exchange it for a trip back to Mars before the starship gets under way."

"Maybe," I whispered. I liked Nanoannie. I hoped she *could* escape.

You will never guess where our folks were hiding, Sekou.

The craft that took us was the *Valentina*. I'm embarrassed to tell you I got micro-g kweez *again*, how boring. I was too sick to look out the viewports.

We came to rest with a bump and Daddy asked, "Are you awake, Kapera? Your mama is here."

Were we still in orbit? I did notice a little weight. Folks say swimming pools are like that. Would you know about that?

The airlock let out onto a barren field, which looked like the top of a rocky hill. The sky was black, as if it were night, lit with a strong searchlight. Then I looked behind me and saw the sun. I got over the shock of the weird, low gravity and peeped around. No wonder it looked like the top of a hill. The horizon was only a hundred meters away!

Crew dressed in suits all different shades of green and brown came out and snapped tethers to our belts. One woman, whose breastplate said WALDEN, commed to me, "Careful! A kid like you might jump up and drift away."

We're on the moon, Sekou. On Deimos.

Sacred Life Base, Deimos, later:

Deimos is a base for the Land Ethic Nomads, Sekou. They believe no life could ever have evolved on this rocky old moon, so their habs here can't hurt anything. Some of them say life is holy in its own right. They say the life of Mars has to grow, or live, or die, on its own. Others want to coax Martian life to spread all over the planet again. There's even some say it isn't so much that life itself is holy, but we need to find out if us human types evolved all by our lonesome in the universe. They fret that we colonists interfered with the original Mars life-forms.

All Land Ethic Nomads think humans shouldn't mess with Mars any more than need be.

If you believe the yellow news sites, Land Ethic Nomads go around torching pharms and venting habs.

They seem way too nice to do that.

Past tunnels and airlocks I saw garden rooms. Plants were tethered to pieces of scrap, wheels from rovers, old burned-out solar panels, broken tools. Is that how they got the rep for torching pharms, stealing stuff that's too raggedy and used up to be good for anything else?

The gardens are just holes in the side of Deimos with a heavy-duty transparent

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window on top. But they supply food for Land Ethic Nomads down on Mars. Yes, they do have a spacecraft fleet, though that's a different story.

Daddy insisted on carrying me, like a newborn cuy.

Walden was a skinny woman, dressed in raggedy clothes, all faded patches. Her smile was so friendly, you didn't mind the gaps in her teeth.

"I'll take your daughter to our robotic surgeon," she explained gently to my father. "Artificial blood will help."

Daddy held my hand while she started an IV. It didn't hurt all that much.

Walden said, "The robotic surgeon can follow you if you want to stay with your parents. Let the surgeon do its job. It's a couple mears old, but it's a good one. They don't build stuff like this on Earth anymore."

I couldn't have weighed a whole kilo on Deimos, but Daddy carried me again.

We were no sooner out of the clinic than I heard, "How long has she been here? Let me see her!"

Of course. My charming mother.

She charged me like some rover with a berserk guidance system. I was afraid she was going to smash me when she grabbed me. And she *would* have to start crying.

"Oh gods and stars." She got tears all over me. "Your father told me what happened. Listen, Kapera, I hate spending a minute away from you, but we have to negotiate. We can still catch the Down Escalator."

"I know, Mother." She treats me like I was stupid. You, Sekou, were the smart child, if you believe her.

She frowned, but went on, "You should be in the clinic, resting. When we've got a firm bargain, we'll come get you. Okay?"

"No," I said. "Not okay."

She let go of me and searched my expression. "Why in the world not?"

"I know stuff you and Daddy need to know. I need to be in on the haggling."

She looked at Daddy. "Can't you do *anything* with her?"

"Sweetheart, your mama is right. This negotiation will be exhausting. Go with Martialle Walden and rest up for the trip."

"No!"

"Kapera." His voice had that edge.

So Daddy and this Walden lady dragged me back to the clinic. I almost said some bad words.

I'm not going to put up with this, Sekou. If they screw up, it's Mother's fault for acting like I was a baby.

Later: Still in Sacred Life Station:

This sorry machine tried to inject me with a sleep drug!

Robotic surgeons are not super smart, Sekou. I've learned a lot about them recently.

They do know the word *allergic.*

One of my teachers said when Martians and Luners go to Earth, sometimes they get allergic because we don't have stuff called pollen and animal dander on Mars and Luna. When it first started happening, it was scary. Martians would just swell up on Earth and die.

The robotic surgeon was about to put something in the line it was using to give me artificial platelets. I yelled "Allergic!"

It flashed a zillion types of sleeping pills it could give me, and I kept saying "Allergic." Finally it gave up and just fed me the platelets.

The bad part is that it has an anesthesia squirt so you don't notice the needles. It decided I must be allergic to that, too.

Also, they uplink and share data. Now every medbot in the Solar System thinks I'm allergic to sedatives.

But after my quarrel with the robotic surgeon, I felt perkier. The gravity makes you feel like you're bobbing around in a tub of H_2O. Not like on the *Chrysalis*, where microgravity gives you the kweez.

The surgeon purred itself down to rest mode. I dragged myself up—

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breathing through my mouth because it had sprayed foam to stop my nosebleed—and pulled it down the tunnel. Wasn't heavy, but it had a lot of drag. It woke and made these stupid sounds—*Pojhalesta! Pojhalesta*! An old Russian model, and I didn't have my translator.

Lines and hoses ran all over, so the hatches aren't sealed. I followed the voices. My folks were arguing with somebody.

"Take it or leave it," my mother said.

"Come now," said a familiar voice. "Your only daughter. Surely you can do better."

My mother said, "You are cold, Martialle Spirit. I have nothing more to offer."

A pause. "We believe you do. If it were your own family frozen in the dust behind Smythe Pharm, you could perform miracles."

"I can't raise the dead. Dead is dead. But if cryosleep went well and revival protocol goes right, they will revive. If! Remember, many of my test animals perished. How can I know if the failures were in the initial procedure, or the revival protocol?"

My father sounded frazzled. "She has nothing more, Martialle Spirit. I many times assisted with the test animals—upwards of a hundred—and this is as good as it ever got. "

"Forty-eight percent." My mother was angry. "And some that made it through the first attempt were unsalvageable on the second."

After a pause, the familiar voice said, "Suppose you were going to Yggdrasil? Couldn't you to improve the odds?" The familiar voice was Crystal Spirit. How did she get here, on Deimos?

Mother shot back, "No! I have given you everything I had, the computer simulations, even my speculations. Also net research dating back to before Jeffrey Allen. The heat-shock protein protocol just won't reliably thaw living tissue."

A pause. "Then what *is* perfect? Give us a better protocol."

"Hire your own researchers. I'm not available; my daughter needs me now."

Another pause before Crystal Spirit spoke and gave it away. She was teleconferencing. "And how do you propose to finance this journey?"

My father spoke slowly, as if Crystal Spirit had been bashed in the head with a meteorite. "Our passage was paid. Your agents detained us. Ethics demand you provide faster transport to the Down Escalator."

"Our agents? We didn't trash Smythe Pharm."

Mother burst out, "You've destroyed our lives blackmailing us for information we don't have."

"Choke down, Zora," said Dad. "They haven't said they won't help us."

"Help us? Help us? How about undo the damage they did!"

"They said they didn't trash the pharm," said Dad. Did he swallow that one? "Look, what we have, we've offered. We can't guarantee results we haven't ourselves obtained."

Crystal Spirit sounded worn down. "Well, where is the microdisk?"

My mother said, "I need assurance that you'll fulfill your part of the bargain. Acknowledgment that the revival protocol is imperfect."

Dad turned to Mother. "Zora, they haven't made that promise to any new researchers. If they use the protocol as is, people will die."

Without seeing Mother's face, I knew she was thinking hard. "Our daughter's life now versus the lives of people a hundred thousand mears in the future."

Dad thumbed his com back into public mode now. "We want a guarantee you won't use the protocol without more research. Your ship will be a moving sarcophagus."

The pause was not long. "We respect those who carry humanity's seed to the stars. We would never endanger those voyagers."

This had gone on plenty long enough. I staggered into the room. To my sur-

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prise, several others, including Walden, were present and telepresent. Before anybody could drag me away, I piped up, "She's playing you!"

Everybody looked at me as if I had grown wheels and a power plant.

Crystal Spirit, what with the time lag, took longer to notice me. "You poor child. They shouldn't have brought you here."

Mmm-m-mm, just listen to Miss Smartypants! "I came on my own."

She looked at me searchingly. "Your mother is holding out on me. Perhaps you can convince her to deliver the full information."

That made me mad enough to spit!

"Kapera, baby, stay out of this," said Mother. Then, to Crystal Spirit, "I will give you what I have. More I cannot."

"In return," said Dad, "you and your Sleeper nuns must not condemn your followers to death."

Crystal Spirit looked grim. "Give me what you have. We will do further experiments."

Dad said, "How do we know you won't grab the microdisk and leave us in a degenerating orbit?"

"You dare ask? I am a Servant of the Face." Her Face bindi, asleep until now, came alive with a nasty frown.

Dad grunted. "We need assurance."

The pause seemed longer. "Hand the microdisk over when you step off the *Valentina* and board the *Atalanta*. We haven't much time; the shuttle will depart high Mars orbit in less than two hours. The pilot is calculating your trajectory right now."

"Our daughter comes with us," Mother said.

"And you won't use the cryo on the *Chrysalis* passengers until it's perfected," said Dad.

"Agreed to both terms. Agreement recorded on Marsnet legal site. I am Crystal Spirit, Cydonia Institute, Cydonia. Voiceprint yourselves."

"Marcus Smythe, formerly of Smythe Pharms, Borealis Vastitas, here."

"Zora Smythe, of the same. Soon to be of Earth Orbital Transient Station."

Now I wonder. Did our folks give in too easily, because I was there?

This time (thank you, Walden, for that artificial blood!) I stayed awake and looked out through the *Valentina* viewports. It was a longer trip, so the pilot decided to pressurize, telling us to keep our helmets close by.

Mother doesn't yak much when she meets folks, but Dad likes to learn what he can about people. "What trajectory are you using to get to the *Atalanta*?" he asked the pilot. Dad mentioned he never piloted any actual spacecraft, but long ago in North America, before he met Mother, he was in the Air Force, did you know that?

The pilot said, "The way it works out, I'll drop my other passenger back on the *Chrysalis* and wait there for a refuel. Shouldn't take long; the fuel comes from Phobos. Then I'll go for the *Atalanta*. We should have no trouble intercepting it once I've dropped the other passenger and cargo."

"What's the other cargo?" Dad asked.

"Lizards and lizard eggs. Young man thought he could sell them back on Deimos. The nomads weren't satisfied they would reproduce in low g. But his money's good, and he's resigned to pay for the extra fuel. I told him he should have dumped what he couldn't sell, but he says his future wife will pay the freight."

"Future wife? I hope you transferred credit before you let him board," said Mother.

I had been watching Mars slowly turning beneath us, but I was curious about this wife deal. "Was he one of those guys that got married in that big forced wedding?"

"Wouldn't know. Just know his fiancée is really young, like him. The widow of Elvis Darcy. You know, the Utopia Limited tycoon."

I figured it out first, then Dad, then it

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dawned on Mother. After all, they knew the whole story.

Dad said, calmly, "Do you happen to have a weapon?"

Pilot said, "Why, no. Not likely somebody will pirate a couple kilos of lizard eggs."

"I have one," said a familiar voice.

Everybody looked back.

The other passenger had a gun. He was pointing it at the pilot.

Chapter 35
Song of the Face

When Nanoannie woke, Nordupol was doing some revolting exercise with elastic cords. It looked painful.

"Where did you get those?" she asked.

Startled, he let go of them and flinched as one narrowly missed his chin. "They're in all the cabins. Shall I teach you to use them? You can lose fitness in even a few days "

"No. Tell me when they're planning the next brainwashing session."

"They call it the education."

"Whatever!"

"In about twenty minutes." He extended his wrist puter. The display said, WILL CONTACT UTOPIA HIRES. HERE'S PLAN. "Be ready."

Nanoannie cupped her hand around the display, as if consulting his chronometer. She had read and memorized the map and escape plan. She was good with spatial stuff. She would save everybody and be famous and not have to ever be a boring corpgeek. This was her moment!

"Education" deck, ha.

Crystal Spirit droned and droned. Then she came to the part that froze Nanoannie's blood colder than CO_2 ice. Medical carapaces had been on-loaded, and new data would allow the process to be fine-tuned to each passenger.

"Humanity is no longer a slave to lightspeed limits!" Crystal Spirit sang out. Scary. She *believed* this stuff.

What had happened? Had the Smythes actually given them information they had been holding back?

"We're going to Yggdrasil!" Crystal Spirit thrilled. People in red robes started a chant, "To Yggdrasil! To Yggdrasil!"

Others joined the chant. Crystal Spirit's voice rang out through the din: "We will meet the Builders!"

"The Builders! The Builders!"

"We will conquer physics. We will conquer death!" What was happening? Airborne microscopic receivers that burrowed into your hearing canal, used for crowd control? How else could Crystal Spirit project so deeply, vividly?

Nanoannie scanned the crowd for Nordupol, for Cayce, for Madame Shareholder Chung-Cha Hang, even for Kapera.

Everybody began to clap. "The Builders!" Clap! "To Yggdrasil" Clap! "No death!" Clap!

She glimpsed two figures she recognized, chanting: "The Builders! Conquer death! To Yggdrasil! To Yggdrasil! To Yggdrasil!"

She pushed into a gap so she could see the two girls, legs extended as if flying, faces puffy from microgravity and passion, clapping, shouting, chanting.

Abish and Immaculata. Those Mormonite Jesuit missionaries. Chanting and clapping. Ready to go.

The nuns must have kidnapped them, too. So maybe her parents were here. She shuddered.

"Nordupol!" she yelled. She couldn't see him.

Tears welling, voice thick with dread and hatred, she joined the chant. Her sky-bit hand burned, but she clapped anyway. She was afraid not to.

She didn't want to go. She wanted Sekou. She wanted her parents. She wanted to go home.

Abruptly, Nordupol was at her elbow. He maneuvered around the ship so expertly. Like Elvis Darcy, he must have had previous experience in microgravity.

"Hold this," he said. It was a flat disk,

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the size of her palm.

The thing burned her hand. No, not burned. Vibrated, hard and quick.

Nordupol held up a similar disk palmed in his hand. He put his mouth to her ear. "It jams the bugs. Not that we have to worry, in this melee. Keep clapping."

Her hands floated stupidly at shoulder level. She palmed the disk and clapped awkwardly around it.

"The escape is set for twenty-four hundred, Utopia Limited time."

"Won't the soyuzoids be locked?"

"With due respect, Martialle Nanoannie, you forget this hab module was built by Utopia. The engineers who designed the soyuzoids are our friends."

"Then why didn't they slip away when they got the chance?"

"Again, with due respect, you remember what happened to your husband?"

"*Husband*? Oh. You mean Elvis Darcy."

"Chairman Darcy's mistake was trying to escape at the wrong moment in history. We will escape at the right moment: all in a group, and at a moment when they think we're helpless."

"You call this history?"

"Nanoannie Centime, we are living history. If the *Chrysalis* leaves orbit now, and the people of Earth, Luna, and Mars discover that it is a death ship, there will be no more attempts to explore extrasolar planets."

Nanoannie felt a pang of excitement. Though the *Chrysalis* was doomed, still maybe Nanoannie and Sekou's grandchildren might leave the Solar System. She herself might be still be alive to go on the generation ship. All she had to do was not die between now and when it left.

Nordupol continued: "I must go to find corpgeeks I've missed." He braced himself to glide way.

"Nordupol!"

He turned, eyes alert.

"Could we take those two girls over there?"

"I think so. They are?"

"Friends of mine. And my family—"

He raked fingers through his hair. "How will I know your family?"

She had no com, just a holocket of her faves: Escudo and Krona, Zloty, Kapera, and the age-progressed image of Sekou.

Nordupol glanced at them. "I'll try."

"This guy isn't on the *Chrysalis*, they claim." She indicated Sekou. "And I have another friend. May I tell him?" Cayce. Except—

"Can you trust him?" His gaze met hers, hands steepled before his face in salute. "Careful!" He swam away, though air, like a swordfish she had seen in a video.

Cayce? Trust Cayce?

Living her life on an arctic pharm, she had few friends in the flesh. Her school friends were disembodied images and voices. She wasn't even sure what they looked like. Guys she'd played virtual sex games with, they undoubtedly edited their images. She edited hers, too, made her pretty little tanks fill out her bra more. She didn't change herself too much. She was who she was: her face—what had Kapera said? Like a lion. Not a zoo lion. A Serengeti lion, from Earth.

Everybody did it. Well, not Kapera. No sense of style.

Those few people she'd met in the flesh were more *bonded* to her. She knew what they looked like, what they *smelled* like.

So why *wouldn't* she want to save them? Besides her family, they were the only intimate contacts she'd ever had. Even Cayce.

Aware that she'd stopped clapping, she started again. People were singing. Crystal Spirit must have those micro speakers cranking full blast. One song would catch everybody's voice, then as people forgot the words, blend into another. Some songs celebrated the stars and the Face; others were school songs, club music, even commercials. She mingled her voice with the chorus, excite-

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ment clogging her throat.

But at midnight—

Suddenly she remembered Cayce's Face bindi. If she stuck it to her forehead, would it make her less conspicuous?

She fished it out of her pocket.

It crumbled like a scab.

Chapter 36

Between Valentina *and* Chrysalis: *the Terrifying Void*

Still on the Valentina, *Summer-April 20, 2202:*

Dear Sekou,

It was Cayce. He had a gun like from an old-fashioned flat vid from the twenty-first century.

"Hey hab-rat, don't bother to introduce us," Cayce said. "Your parents, right? Hi, I'm Cayce." He stuck out his left hand to shake, still holding the gun on Dad.

"Where did you get that thing?" Dad asked.

"Bought it in a dark tunnel in Sagan City. I was going to say it came from my pioneer grandfather, but that would be jive."

"What are you planning to do to us?" Mother asked.

"Rescue you," said Cayce.

"Kapera," said Dad, "I need you to move aft quick as you can. Get down below the seat back there."

Cayce said, "Pops, I'm on your side, honest."

The pilot had turned around. "You lied when you bought your ticket, young man. For this, I could dump your entire cargo."

"Knock yourself out," said Cayce.

"I can't reroute the *Valentina*," the pilot said, "and there's nothing worth stealing on it except for your sky-bit lizard eggs."

"We don't need to reroute. You're taking me back to the *Chrysalis*."

I stared at him. "You escaped, and you want to go back?"

"To pick something up." He turned to Dad. "This pilot is in the pay of Utopia, and they're gonna steal your research and dump you in a forced labor camp where you'll do R and D for them until you dry up and get added to the compost. Without pay."

Dad shook his head in disbelief.

"Be reasonable, young man," Mother said. "You've your whole life ahead of you. Just give the gun to the pilot and we can forget this trifling episode. You can get on with your career in, what was it? Lizard pharming?"

Cayce shrugged. "Don't believe me? Why do you think Crystal Spirit gave in so easy? You think she really believes that cuy crap about you not having the complete secret formula?"

Mother and Dad looked at each other, then at me. "He might be telling the truth," I said. "Except for this stuff about marrying Nanoannie."

Cayce snorted. "I've been vibing with Nanoannie for a long time."

I said, "He did meet her at Cydonia, and she acted kind of all kissy-struck about him."

"See?" said Cayce. I really didn't need this. I tried to edge away from the pilot, so he couldn't shoot all of us at the same time.

"It would be really nuke," Cayce added, "if you all stayed together."

"You're not going to shoot," said the pilot. "A bullet would breach the hull and we'd lose pressure fast."

"I've got my helmet ready to pop on," said Cayce. "I suggest everybody do likewise. Except you, my astrogeek friend." He took the pilot's helmet and stowed it out of reach. To us, he said, "I can still shoot you if you get out of line."

Dad said, "You don't even know what you're doing. You may not even have ammunition for that antique. And if you do, you lack the intelligence to take the safety off, and the guts to fire it."

"Try me, Pops."

"Listen, buck," said the pilot, "I'm your lifeline. If you shoot me, how can you dock the *Valentina*?"

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"Easy," said Cayce. "I contact my fiancée. She's an ace pilot. Landed like a feather back at Cydonia. So I contact her and she helps me program this puppy back to the *Chrysalis*."

The pilot looked scared and angry. "My course was already set. I have only the fuel to get back to the *Chrysalis*. So there was no need to hijack me."

"So you say," said Cayce. "But listen up, Kapera and Doctor-Doctor: he has a different trajectory set in the craft's puter."

"Don't believe him," I said. "He's after taking Mother's research and not letting us go." I figured he wanted to steal Mother's microdisk, then turn my parents over to the nuns, who would force them to supervise freezing people on the *Chrysalis*.

"Shut up, mole-rat. I'll prove it when we can talk to Nanoannie."

My brain was all confused. "You sure moved fast. I know she's hot-blooded, but I can't believe you got her swept away so quick."

He just smirked, Sekou.

I certainly am overjoyed I'll never see a smirk like that on *your* face, passed over and beyond as you are.

I thought, That antique gun is probably all gummed up from sitting around on Mars in the dust; maybe it will blow up in his face, but that won't do *us* a lick of good. Probably take out half the hull of the *Valentina*.

"I want you three safely aft," Cayce said.

Dad said, "Let us put our helmets back on. In case the *Valentina* loses pressure as we rendezvous with the *Chrysalis*. Standard safety procedure."

Cayce scowled. With helmets on, we could put our coms on private channels, and plot against him.

Cayce's helmet looked pretty well designed, but it would still block his peripheral vision. Yet Dad was right about the danger during docking. Cayce thought a moment, then reluctantly put his own on.

Still, he needed the advantage over the pilot. He commed, "No helmet for skygeek here, though. If he blows the airlock—"

"I'll keep that in mind," said the pilot.

"Listen, picobrain, blow the airlock and you'll be sucking sky with the rest of us."

Such a big man he thought he was with that gangster talk, Sekou. "Skygeek," "sucking sky," indeed. Next he'd threaten to give us a "room with a view."

We three went to the back—*aft*, they call it. I figured the viewports were the weakest part of the craft, and the first thing Cayce would shoot out. If one of them blew, we'd be less likely to be sucked out from back here.

And if the pilot for true *was* supposed to abduct my folks to some slave scientist camp—well, *he* might blow out the viewports, too.

Once we were aft, Dad motioned me to strap in next to Mother, and crouched behind us.

"How do you feel?" Mother asked. About time she showed *some* interest in me.

"Peachy," I said.

I never tasted a real peach. Just peach-flavored candy, cake, medicine, you name it. So "peachy" was just about true.

Cayce watched us, but then he got involved in what the pilot was doing, so Dad asked on a private channel, "Think he's telling the truth?"

"About Nanoannie marrying him? She liked him when she first saw him back at Cydonia, but then she got all hinky with him."

Dad said, "Can she help him dock the ship, if he shoots the pilot?"

I shook my head. "Nanoannie is a Marsplane pilot, not an astronaut."

"He's playing us," Mother said, flatly. "You don't have the experience with people, Kapera, but I've seen types like him."

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"You don't know anything," I flashed at her. "If Nanoannie likes him, he's okay."

"I don't trust Nanoannie," said Mother. "Nor should you."

Dad said, "If he's not lying, we'll be forced to hand over the revival protocol, Zora, and it'll kill more than it'll save."

"I'm concerned with our daughter. If we don't make our connection to the Down Escalator—" She didn't finish.

"The medical carapace gave me platelets to boost me up," I said. "I feel just fine." Which was a fib.

"That's another thing. We don't have any record of what treatment she's received."

Dad said, "Like any medbot, it'll upload to Marsnet and we can access those records at Earth Orbital Hospital."

Mother drew back. "That thing on Deimos? Looked like it was built out of scraps from Mir? I bet it didn't upload data to anything. Land Ethic Nomads don't cotton much to Marsnet."

"The important thing is that it kept her healthy."

"Healthy? Are you joking?"

We were all quiet for a moment. Mother probably thinking I was just a little vacuum-head, unable to think or take care of myself.

"So," said Dad. "Are you going to give the nuns the revival protocol? No matter what the risk?"

"I don't know!" She folded herself up small, glaring at the viewport, where we could see the lights of the *Chrysalis*.

Dad patted her arm, not super effective, considering we were wearing space suits. She began to cry, tried to wipe her nose, realized she was wearing the helmet, and swallowed. Mother tends to be melodramatic.

"What a sorry mess," said Dad.

Cayce and the pilot and the nuns had all promised to get us to the Down Escalator in time. But somebody was jiving, and maybe it was too late, even if *everybody* was straight up.

And I don't think they were.

How nuke it would be to grow up and rove all over Mars? Look for fossils in Valles Marineris. Publish my adventures. Maybe even get married and have a little kid of my own. I'd name it Sekou.

I always thought, well, boyfriends, marriage, I'm not interested. Yet! But *never*? Nanoannie is only two mears older than me, and here she's been married, widowed, and engaged to be married again. I want my turn!

Mother's face was getting all nasty in that helmet. No way was I going get my face all snotty and wet, so I just stayed cool.

I looked through the viewport. Something was looming up fast, a shape like an humongous umbrella, with things on the handle end like giant stiff flags. The *Chrysalis*.

I felt a *pop!* through the hull of the *Valentina*.

Oh no! Cayce and the pilot were struggling over the controls. The gun floated free, two meters away from them.

A shrill alarm. The sound every kid on Mars is taught to fear: airlock malfunction.

The pilot's helmet was floating just out of reach, but he made a grab for it. Cayce slammed the pilot's face into the control panel and grabbed for the gun.

Cayce jammed his own helmet on and barked through his com. "Listen, kid, Pops, Mom. This brain-dead geek tried to debark the craft and leave us without a pilot. What do you think of that? Who do you believe now?"

The pilot, with no helmet on, couldn't contradict him. Cayce snatched the gun in one hand and the pilot's helmet in the other. *Pop*! I saw the helmet deform. It didn't break, but I bet it wouldn't mate with the pilot's suit any more.

The pilot turned back to the controls, working frantically.

"Dock us," said Cayce. "No more tricks."

Dad said to us, "I think the pilot is trying to get all of us within retrieval dis-

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tance of the *Chrysalis*. He knew we had helmets, and he hoped to get his on before Cayce could stop him."

Mother's eyes looked tired and old. "Maybe. We've got a bad situation."

She thought it was bad? I just wanted to have a good cry and take a nap.

Dad hesitated. "You have the microdisk?"

She wriggled her right-hand ring finger. Cayce couldn't hear her, or see the tiny gesture.

Dad said, "Our ticket to Earth."

"Go!" said Cayce.

My heart jumped. We were rushing toward the *Chrysalis*. Or *Chrysalis* was growing bigger and bigger in the viewport, hurtling into us.

Too fast! We were going to smash into the *Chrysalis* docking port, and whack *Valentina* to pieces.

Then we'd float in orbit, Mars far far below. For a long time.

Suited people stood on the hull of the *Chrysalis*. Could they see us?

Our airlock was stuck open.

The pilot—or Cayce—had wrecked the *Valentina's* airlock machinery.

Cayce had his helmet on, and the pilot lunged for his own, apparently hoping it would still do some good. Cayce hurled it aft toward us, and the pilot pivoted back to the controls trying to avoid the collision.

I think he was trying to activate the autodocking program.

We fell toward the top of the *Valentina*. It looked like the *Chrysalis* docking port was spinning like crazy in front of us. Except *we* were spinning. The port loomed toward us. Then it hammered into the nose of the *Valentina*. The viewports popped from their frames and we got sucked forward.

Thank the stars Mother and I were still strapped down. Dad braced himself behind the seats.

The pilot's helmet bounced past us. Dad grabbed at it and lobbed it forward.

The pilot caught it with one hand, frantically punching controls with the other.

Then we were still.

My head was still spinning, though. I thought, now I get the room with a view. This diary will floating in orbit, with me forever. I guess I won't die of leukemia after all. It was too late to be angry or try to stop the pilot or Cayce.

But! A big scary machine reached out from *Chrysalis* toward the *Valentina*. I blinked. A robotic arm. I guess it just happened to be in position, and with a jolt, it grabbed *Valentina*.

Redsuits pulled us from the *Valentina* across a terrifying gap between the smaller craft and the *Chrysalis* docking port. I looked around, too scared to be scared, and saw the stars, then Mars. Valles Marineris, I realized. My favorite place I've never been. Maybe Mars itself wanted me to live.

Over his com, Dad screamed, "Zora! What are you doing?"

A big pregnant redsuit grabbed me and hauled me into the dock easy as a toy balloon. I turned my head to see my mother, my insane mother, taking off her gloves in vacuum!

Quickly, deliberately, she shook hands with herself, then made a throwing motion. The gloves floated away. Dad grabbed for them, caught one, and pushed Mother into the *Chrysalis*.

If Cayce had wanted to deliver us, and the protocol, to Crystal Spirit, he had succeeded.

The nuns hustled us through an airlock, into a cargo bay. They stared at us, wondering what to do with their prize.

Because we *were* a prize. We had the revival protocol.

Didn't we?

"Why did you do that?" Dad asked Mother.

She held up her naked hands. "I changed my mind."

Her ring was gone. ■

To be concluded.

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Survival, Julie Czerneda, DAW, $23.95, 401 pp. (ISBN: 0-7564-0180-1).

The Silent War, Ben Bova, TOR, $24.95, 380 pp. (ISBN: 0-312-84878-1).

Scarab, Don D'Ammassa, Five Star, $25.95, 268 pp. (ISBN: 1-59414-144-4).

Lost in Transmission, Wil McCarthy, Bantam, $6.99, 371 pp. (ISBN: 0-553-58447-2).

Heaven, Ian Stewart and Jack Cohen, Warner, $24.95, 343 pp. (ISBN: 0-446-52983-4).

A Scholar of Magics, Caroline Stevermer, TOR, $19.95, 300 pp. (ISBN: 0-765-30308-6).

He Do the Time Police in Different Voices, David Langford, Cosmos, 222 pp. (hc, $29.95, ISBN: 1-59224-057-7)(pb, $17.95, ISBN: 1-59224-058-5).

The SF Book of Days, Don Sakers, Speed-of-C Productions (www.scattered-worlds.com), $14.99, 183 pp. (ISBN: 0-9716-1476-8).

The Twentieth Century, Albert Robida, transl. & intro. by Philippe Willems, Wesleyan University Press, $29.95, 397 + lxiv pp. (ISBN: 0-8195-6680-2).

The Adam Strange Archives, Volume 1, DC Comics, $49.95, 224 pp. (ISBN: 1-4012-0148-2).

Superman on the Couch, Danny Fingeroth, Continuum, $19.95, 192 pp. (ISBN: 0-8264-1540-7).

Julie Czerneda begins a new and intriguing series—Species Imperative—with **Survival**. At the time of the story, Earth has finally taken its environmental responsibilities seriously. Many areas have been set off limits to human impact. Dr. Mackenzie (Mac) Connor is the codirector of one such area on the northwest coast of North America, where she studies salmon and aims her research at the idea that genetic diversity is good for survival. Yet humanity is hardly Earthbound, for the galaxy is now theirs as well. And that galaxy is home to many other sentient species—all but the Chasm, where the ruins say life once was, but all is sterile now.

An old friend, Emily Mamani, has just arrived to help Mac for a season. But they are immediately interrupted by a visitor from the Ministry of Extra-Sol Human Affairs, Nik Trojanowski, and Brymn, the first of the alien Dhryn ever to visit Earth. She promptly pushes Nik into the drink but eventually settles down enough to learn that Brymn wants her help in studying a mystery: Various worlds along the travel lane between the Chasm and Earth have been attacked by something strange; whole valleys go lifeless, sterilized. The Ministry is worried that Earth is a target, and when invisible aliens, the Ro, show up, Mac lets herself be drawn away to visit the Dhryn homeworld.

What are the attacks like? Czerneda describes in short vignettes, right from the beginning, a rain of green fluid, the digestion of living things, and the

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mouths that feed on the result. Are the Ro responsible? Brymn says they are the foe, they may come from the Chasm, maybe they are. But as Mac learns, the Dhryn are curious folk and they too may date their origins back to the Chasm days. It takes a while for her to learn enough to figure out the truth, but Czerneda lays out enough clues for the reader who may well suspect the truth fairly early.

Mac and Nik, Emily and Brymn, these are the central characters of the tale, and Czerneda draws them deftly and convincingly. She drew me in and kept me reading better than many do, and she kept me wondering too. What is the species imperative that names the series? She never says, but Mac's research emphasis hints that it must have something to do with diversity. On the galactic stage, that may mean that she intends to reach conclusions about the value of keeping intelligent species from dying (as so many did in the Chasm), perhaps by devising preserves like Mac's research site to encompass whole worlds.

Hmm. This does remind me of David Brin's Uplift universe, with its fallowing of worlds and even galaxies. And then there's Brymn . . . Sheer coincidence? Maybe, but . . . If there really is a connection, a reader may enjoy rereading Brin before or after *Survival*.

Ben Bova concludes his Asteroid Wars trilogy with **The Silent War**, maintaining Martin Humphries as a classic mustachio-twirling villain but turning good-gal Pancho Lane into something nearly as bad. The tale began with *The Precipice* (serialized here) and *The Rock Rats*, introducing Pancho as a jet-jockey who managed to succeed to the chairmanship of a major rocket shop, the Astro Corporation, and then goose humanity out to the Belt, where the rock rats could extract ores for an Earth wracked by the aftermath of climate disaster. Humphries then plots a scheme to take over the Belt. He sets up a competing shop, sends out hired company prospectors, and puts a killer to work scaring off the independents.

Now Humphries is still at it, while Pancho Lane plots deeds just as evil to counter him. Lars Fuchs, whose wife Humphries stole, plots murder. The Yamagata corporation plots to help Humphries and Pancho destroy each other. And a mysterious artifact holds a hope of redemption for all who are willing to admit that they have done wrong. (Guess whether Humphries has any hope.)

The characters are familiar. Bova spends little time on characterization or motivation this time out. The point is plot and scheme, death and destruction, a deliberate metaphor of kids in a sandbox destroying each other's toys until someone slaps them up the side of the head. As a finale to a series, it works well. As a stand-alone, the reader would surely find it wanting.

If you enjoyed the first two books, you'll want this one. If you missed the first two, go read them first.

Don D'Ammassa has been reviewing science fiction and fantasy at the *Chronicle* (a news magazine for the genre, along the same lines as *Locus*) for almost as long as I have been at *Analog*. He's also been writing SF, though he only turned his hand to novels in the last few years. The latest such is **Scarab**, an interesting tale of obsession and detection.

The hero is Sandor Dyle, a wealthy dilettante with a talent for pattern analysis. When the local cops realize he is stuck on Tashista between ships, they beg him to have a look at an aggravating mystery in the city of Soshambe. A killer, nicknamed Scarab because he commits his crimes only in the secant (month) of Scarab, has just slain in most brutal fashion the son of a local bigwig. As Sandor becomes acquainted with the world, the reader sees a social structure that is a satiric take on our own. Tashistans believe that the right and proper way to

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live is to scramble for money so that one might move up in the world, and every position of any note is for sale to the highest qualified bidder. The local chief cop, or head of prefecture, Marym Dunnis, got her job in just that way when her predecessor, Savram Aras, developed a fatal illness of body and mind. She tells Sandor that Scarab seems to leave no pattern to be analyzed, other than timing, victims drawn from the poor section of town, and the brutality of the deed. She also reveals that Aras had lost a wife and son to killers, and that he had focused his energies quite intensely on the Scarab case. When Sandor visits Aras, he finds him a fair hand at pattern analysis.

And then the pace of the killings picks up. Sandor thinks Scarab may be challenging him, and in due time he discovers the villain. The reader may be well ahead of him, but the tale need not then succeed solely on the strangeness of Tashista and on a prose that seems to echo Conan Doyle a bit, as well as Jack Vance and perhaps even Laurence Janifer in his tales of Gerald Knave: Survivor. D'Ammassa is inventive and ingenious enough to make both hero and villain believable.

Wil McCarthy's **Lost in Transmission** continues his saga (following *The Wellstone* and *The Collapsium*) of a future humanity grown wealthy and immortal with the aid of programmable matter, 3D fax machines that can restore one's ideal state of health and youth, and more. Alas, the young—including Prince Bascal of the Queendom of Sol—saw no future so long as their elders hung around. They rebelled, had a high old time playing pirate, and were inevitably brought to heel. The sentence, after suitable retraining, is to board the first colony ship to the stars, the *Newhope*, and hie off to Barnard's Star. Most of the thousands of erstwhile rebels are stored as fax patterns, but a few must be present *in corporo* to run the ship. Here is Bascal, elected king of the new colony, his old friend Conrad Mursk, an architect who is utterly incapable of leaving well enough alone, Conrad's lover and *Newhope*'s captain Xmary Li Weng, and more, all companions from youth destined to be founding fathers and mothers of a new world.

Unfortunately, that world is metal-poor. The colonists' numbers are not enough to maintain a normal economy plus maintain, repair, and build all the gadgets they grew used to at home (things like those 3D faxes). Trouble looms, and immortals die.

Not that the future is all that rosy back home. The book opens with Conrad and Bascal back in Sol System, where Earth has been swallowed in a black hole or something like and household robots have mounted an insurrection. They've got a mysterious maguffin to deliver to a nearby city, but the robots are attacking, and . . .

How did they get back home? *Lost in Transmission* answers that question for Conrad, but not for Bascal. There's another tale to tell, and perhaps we'll see it before long.

Ian Stewart is a math professor at Warwick University in England. Jack Cohen is a well-known reproductive biologist and "alien design" consultant. They've done popular science, both singly and together, and SF to boot, notably *Wheelers* in 2001, for which they created a plausible future marked by an intense twenty-first century reaction against technology, especially computers that are smart, but not quite smart enough. Now they give us **Heaven**, where the computers—especially the ones embedded in ancient Precursor artifacts such as starships—are more than smart enough, but people are being stupid in another way.

On the world of No-Moon, there lives a sort of sentient coral. The males, such as Second-Best Sailor, resemble giant jellyfish and sail upside-down ships on

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trading missions. The females are reefs, and when they connect up their individually puny brains, they display impressive cognitive prowess. Indeed, when they hear that a Cosmic Unity mission fleet is on its way, they recall what made them flee their original world ages ago, recognize the onslaught of a memeplex that is capable of great evil "for your own good" (think Inquisition), and project disaster. Meanwhile, Servant-of-Unity XIV Samuel is being trained for a place in the church's hierarchy and exposed to some of the things the church does "for your own good." He *doesn't* like them, even when they have a definite perverse logic.

And the Neanderthals (rescued from Earth ages ago; they lack a spiritual sense and are immune to memeplexes), who live as traders and travel on Precursor ships that must be coaxed to do their bidding, are being enlisted by the reef-mothers to carry a portion of their kind to another world, where perhaps they will survive the disaster. Unfortunately, that world turns out to be deadly in two ways, one of which turns out to be key both to making Precursor ships more cooperative and to defeating the Cosmic Unity. The other . . . well, suffice it to say that Second-Best Sailor, XIV Samuel, and the Neanderthals are going to meet before the end.

Stewart and Cohen can write, and Cohen's aliens are as always quite convincing. But I found three problems that may not be showstoppers—plenty of other writers have committed the same and similar sins—but do interfere with the suspension of disbelief. The first is the Precursor technology, which they deploy far too much like a magic wand, just the ticket whenever the plot needs a boost. The second is the attack on religion; I don't disagree with it, but I do find it rather heavy-handed. The third is the repeated insistence that life—at least when prone to memeplexes—is a disease on the living, thinking galaxy, which I found too hard to swallow.

As they say in the chatrooms, YMMV (your mileage may vary).

Caroline Stevermer is a charming writer with a talent for spirited heroes and heroines. She earned plaudits for *A College of Magics* (2002), set in an Edwardian England where magic is a genuine part of the curriculum—right beside rhetoric and decorum—and Glasscastle University can be devoted to magic alone. Being English, Glasscastle is populated by stuffy dons and infested with politics. But there is also a touch of Wodehouse to leaven the elegant drawing-room atmosphere with humor. And then there are mystery, adventure, derring-do, and romance. . . .

It's all there again in **A Scholar of Magics**, which brings a sideshow cowboy to Glasscastle, where the researchers of the Agincourt Project need a sharpshooter. Samuel Lambert is an American innocent, wide-eyed before the wonders of Europe and quite enchanted by the magical chanting that wards the university against the perils of the outside world. He thinks that it would be nice to be a student there but is told that Americans just can't qualify. Not only do they lack the appropriate "quality," but since magicians have trouble crossing water, those who survived the crossing to be colonists lacked magic, and so of course do their descendants.

He is also a practical fellow who patiently puts up with the demands of tea with Amy Brailsford, wife of the provost, and her insistence on reading his palm, feeling the bumps of his skull, and even examining his tea leaves. Both innocence and practicality are tested when the provost's sister Jane appears from France with a gift for mischief and a message for Nicholas Fell, who has let Samuel share his donnish quarters. It seems that Fell is the new Warden of the West, but he refuses to accept the post.

And who is that bowler-hatted gent who has just fled Fell's study, leaving the

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top-secret plans for the Agincourt Device on his worktable? Why is it that no one but Samuel and Jane saw him? Where is Fell himself? Why does Amy's pendulum point to Ludlow, home of the Earl of Bridgewater? And when Samuel and Jane hare off in pursuit of mystery, where does Jane vanish to?

Samuel and Jane are clearly drawn to each other, but in the Edwardian world, propriety keeps them from doing much about it beyond a few potent glances. That adds a nice tension to the chain of burglaries, kidnappings, and schemes that drives the plot along and ensures that the reader looks forward to Stevermer's next.

Certainly I will. I enjoyed this one.

David Langford's **He Do the Time Police in Different Voices** is a delightful collection of SF parodies and pastiches. It includes everything in *The Dragonbiker's Guide to Battlefield Covenant at Dune's Edge: Odyssey Two* (reviewed here in July 1989) and adds another 40,000 words of good, clean fun targeted at Asimov's robots, Rex Stout's Nero Wolfe, Conan Doyle's Sherlock Holmes, Agatha Christie's house parties, Lovecraft, and of course E. E. "Doc" Smith ("Sex Pirates of the Blood Asteroid"), among others.

There's no title story, but you should have fun with it anyway.

Don Sakers's **The SF Book of Days** doesn't need much reviewing: It's there, it offers "a science fiction/fantasy event for every day of the year . . . and for quite a few days that *aren't* part of the year," and it even tosses in lists of names for alien months and other names for the days of the week (including ten-day weeks!). Thus Sunday is variously Sunnendei, Senkyeh, Kiriakos, Elenya, and so on.

This one is for fans who just cannot survive without knowing that Wildfire joined the Legion of Super-Heroes and explorer Cogdon Nestor wrote to Edgar Rice Burroughs to report a telegraph in the desert on the same day, June 1, of 2981 and 1916, respectively.

Have fun!

Albert Robida's **The Twentieth Century**, first published in 1882, now enjoys its first English translation, and with reason. It's a novel, but it is an astonishing bridge between the older utopian approach and the pseudo-realism of modern SF. Since Robida provided several hundred illustrations for his work, the novel is also a bridge to the modern graphic novel.

Robida's technology is pretty quaint, but his social projections are eerily close to dead-on. He projects social upheavals at the times when we had two world wars and calls for a feminist revolution, home shopping, a sort of Internet, and a good deal more, all revealed as his protagonist Hélène searches for a profession. His biggest miss is surely that he thought we would have it all by 1952!

The book is an excellent illustration of one of the major hazards of futurism: the tendency to see the future in terms of the present. Thus Hélène winds up quite conventionally married. In addition, although Robida describes a tunnel between France and England, he also expects personal travel to be based on balloons (as if to say, "Whatever we do, the future will do it better"). In this light, it is worth recalling the late Isaac Asimov's *Futuredays: A Nineteenth-Century Vision of the Year 2000*, published by Henry Holt in 1986. Asimov's text accompanied a series of cigarette cards commissioned from Jean Marc Côté in 1899. Here too the technology was quaint, but the balloons had given way to gliders and airplanes with fabric wings (some rather as if the Wright flyer had mated with a bat). Robida is just as fanciful, but because he considered at novelistic length the social impacts of technological and economic changes, he remains more interesting.

Back in 1958, the late Julie Schwartz

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created Adam Strange as "the thinking man's superhero" (meaning he outthought the foe, rather than superstrengthed or super-magicked them). The DC Comics strip lasted for years, complete with Schwartz's technical footnotes about Incas and light-years, spaceships that looked more like submarines, and of course rockets that banked and swooped, not to mention evil geniuses, aliens, mad scientists, and more aliens.

Great fun at the time, and if my mention of those days stirs a bit of nostalgia, you can rush right out and buy **The Adam Strange Archives, Volume 1**. Have fun!

Speaking of comics, Danny Fingeroth has had a long career in comics, notably as the man in charge of Marvel's Spider-Man line. Now he teaches comics writing at NYU (among other things) and produces books such as **Superman on the Couch**.

His basic premise is fairly simple: There must be a reason why superhero comics are so popular. His thesis is that they reflect (and shape) the American mythos. Superman, for instance, was an immigrant who made good. He was also an orphan, so whatever he made of himself epitomized self-reliance and permitted the comic reader to project hopes and dreams onto him without fear of implicit contradiction by prior history. At the same time, he (like most other superheroes) has a dual identity that cannot rationally stand up to cursory examination but aids the reader's identification with the hero. ("Hey! If he can look like an ordinary schmo but really be super, then I, who really am an ordinary schmo, just might have something super hidden inside me!")

You get the picture. Fingeroth isby no means the first to examine comics with an eye to understanding what they Really Mean. In fact, he cites a number of earlier studies (e.g., Berger's *The Comic Stripped American: What Dick Tracy, Blondie, Daddy Warbucks, and Charlie Brown Tell Us About Ourselves*, McAllister and Newell, *Comics and Ideology*, Reynolds, *Super Heroes: A Modern Mythology*, Steinem, *Wonderwomen: Feminisms and Superheroes*, and more). But though he has genuine insights to offer, his tone is breezy and superficial, and I feel the lack of a more thorough, even academic, treatment of the subject. Fingeroth's great success lies perhaps in convincing the serious reader that the topic deserves that better treatment. ■

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BRASS TACKS

Dear Stan,

The only thing I found deeply disturbing about this story [*Camouflage*] was this strange warning on the title page. Readers are always free to stop reading a story if they feel disturbed by something, and all literature is potentially disturbing to someone. For my part, I would be substantially less disturbed if I could be assured that no such display of angst would occur in this brilliant magazine of yours ever again . . .

Peter Koellner

"Always free to stop reading. . ." applies to such warnings, too! If you don't feel that you need it, ignore it. The main reason for including it concerns very young readers whose parents may not want them starting *certain kinds of material or deciding for themselves whether to finish. That's their parental prerogative, and some of them have expressed an interest in having such warnings in cases that some of them are likely to consider extreme. We want and need young readers, but we don't want to antagonize older ones and send them screaming horror tales about us to other media. This seems to be the best compromise for allowing us to publish occasional sensitive material while helping concerned parents with their job of screening.*

Dear Dr. Schmidt,

I note the serial *Camouflage* has the warning "This story contains scenes that may be disturbing to some readers."

When I pick up a new issue of *Analog*, I always hope every story, feature, editorial, and letter will contain something that disturbs me.

Even a good belly laugh is the result of some kind of disturbance.

On the other hand, the only movie I have ever watched that I thought should have been rated X, Mature Audiences Only, was "My Dinner With Andre." It is my own opinion that the X rating actually indicates it is for very immature audiences.

Ronald Baldwin

Greetings, Dr. Schmidt,

As I work in emergency management and know how vulnerable our infrastructure is to problems, the entire thrust of your editorial on infrastructure design and maintenance ["Achilles' Grid," March 2004] is valid and should be required reading for everyone.

In our work, the electric power supply is backed-up with UPS and an emergency generator. The whole plan is for the emergency management system to continue operating if only the EOC is left standing following a disaster. We have radio, satellite, and mobile communication capability if the landlines go down for all our equipment and communications. The investment is expensive but our business operates no matter what.

Another part of the potential problem that your readers might need to be aware of is the growing dependence on electronic storage when a good EMP can wipe it all out in an instant. Back- ups (if magnetic) would go with the main system unless they are stored in a separate place inside really good electro-magnetic shielding. Back-ups on CDs or DVDs are only a short-term answer as they melt in a fire and do not have an infinite life span. As a starting point it was reported on the Web that:

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"The Dutch PC-Active magazine has done an extensive CD-R quality test. For the test the magazine has taken a look at the readability of discs, thirty different CD-R brands, that were recorded twenty months ago. The results were quite shocking as a lot of the discs simply couldn't be read anymore."

Granted, the reported test was for recordable CDs; but, the reported research results are enough to wonder about non- recordable CDs.

If anyone is interested, the report (with additional citations) was carried at: http://www.cdfreaks.com/news/ 7751

C. Henry Depew

Dear Dr. Schmidt:

Thank you for that marvelous column in the March 2004 *Analog*. I haven't laughed that loud and long in a while. Now, please take a deep breath and stop being so silly.

It is impossible—hear me loud, not possible—for animal populations as large and dense as modern humanity to survive and prosper without complete and total reliance on complex technology infrastructures. I do expect a scientist of your eminence to remember that, even if shaken up momentarily by a major power outage.

Imperial Rome could not survive without the aqueducts, public baths and sanitary facilities, and viaducts and via of its highway system. Ditto for its very developed system for water navigation and transport of large amounts of goods and services.

It would be impossible for the 280 million souls alive in America to exist without density, and the technology infrastructures we depend on implicitly and explicitly every day. Ditto for the electric power grid, which got you started. Our real problem is that the grid we use is old—it was put up during the 1930s and hasn't been upgraded since then. We need a state-of-the-art electricity grid, not the stagecoach system we depend on today, but the people in the commercial power business have no incentive to improve things.

Technology always changes; what else is new? So what if a tintype will outlast a computer-stored picture when the power goes off, or when we shift to a new storage technology? Who uses tintypes today?

Really, for the dire circumstances you were predicting, civilization would have to fall. And in that event, like the ancient Romans and Greeks, we all would have much more critical problems to solve than worrying about where to find secure digital media chips.

I loved your fiction and still love the magazine. But do stop looking for the sky to fall. It's been stable up there since before Chicken Little misinterpreted his data.

Garland L. Thompson

How ironic that you should feel the need to lecture me on how "technology changes," when I'm suggesting a far more radical change than you. You're basically saying since this is what worked for us in the past we have to do more of the same but bigger and better indefinitely. I'm saying of course we can't go back to the old ways, but maybe the new things we've learned can help us think of fundamentally new and much better ones. But it won't be done by glibly dismissing the suggestion with "It's impossible!" (And if you think the metaphorical sky has been that stable for that long, maybe it's time for you to reread those chapters about the Dark Ages!)

Dear Stan,

Your March 2004 editorial gives us a lot to think about. Some of your ideas are right, but others are way wrong.

You are right that we depend far too much on gigantic, remote power stations. Did you know much of your East Coast power is generated in Canada? Quebec Hydro dammed and diverted several rivers in northern Quebec mainly to

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sell power to us. That could only happen because a long-distance electrical grid was already in place. This grid, of course, only exists because the Federal Government has mandated it since the 1930s: big power plants, big power lines, real Soviet technology.

Don't delude yourself about the "economies of scale" either. Those long-distance lines lose a lot of power to electrical resistance. Using many local plants with shorter transmission distances would save a lot of power, a lot of fuel, and a lot of money.

It is also obvious that transit systems need to generate their own power. You were on a train; what about the people on the subway? Even the brakes on those cars are electrical! The subways need their own power plants, and suburban trains should probably run diesel engines. Places like the airports and Port Authority Bus Terminal should have back-up generators. After all, it wasn't the buses and planes that didn't have power, but the terminals that served them.

Your idea that cities are obsolete sounds like more of the "paperless society" thinking you derided. Cities are great precisely because they bring people together. If we didn't get together physically, we would have to do so electronically, and you already pointed out that's not reliable. What's needed is a better infrastructure, one that is less likely to suffer shutdowns.

Manhattan is doomed by geography to always be crowded. It is the crossroads of the Eastern Seaboard, and probably lucky that most of that traffic uses the George Washington Bridge instead of going through downtown. One problem is that the road and toll structures make crowding worse. There are only eight lanes of road across the Hudson, the Holland and Lincoln tunnels, but about 20-30 lanes across the East River. Plus, the toll set-up is such that people going from Brooklyn to Staten Island get a cheaper deal driving through Manhattan and New Jersey!

Worse, all that traffic ends up on Manhattan surface streets. What you need is 1) tunnels running across the island for through traffic, like between the Lincoln and Queens-Midtown Tunnels, 2) more lanes in the Holland and Lincoln Tunnels, probably by digging new tunnels on either side of them, and 3) the same tolls everywhere.

A few more subway lines to New Jersey and some real subway service to the airports wouldn't hurt either (I do not count the AirTrain as "real"). Cleveland had rails to the airport in 1970, as do most big European cities; what's New York's problem?

As for power, how about a Total Gas Energy System? This uses gas for heating, cooling and local electrical generation. The local generators in each building handle peak loads and reduce strain on the electrical grid. There are no blackouts because everyone has their own generator. Gas lines are less likely to "go down" in bad weather—they're buried—and, best of all, America has plenty of gas. We can also turn coal into gas, which is cleaner than burning it, and virtually all biological waste (like sewage) can be turned into biogas. It is fairly easy to convert a gas furnace to burn oil and vice versa; for those concerned about the environment, that "oil" can be vegetable oil or methanol. Sound green enough for you?

I realize nothing can be done overnight, and with political in-fighting maybe never, but here at least are a few practical ideas to make the systems we depend on more reliable.

Bob Sindeldecker

Dear Dr. Schmidt;

Your editorial is usually the first thing I read when *Analog* arrives. Usually I am nearly 100% in agreement with your observations. This month though, I would like to comment on your discussion of photography. I have switched to digital along with many others and am very happy with my decision. My problem is with your preference of physical media (prints and slides) as a way of preserving our

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photographic history. I am well into the process of converting my family's pre-digital archives to digital format. This goes back to family print albums with photos from the nineteenth century and includes my fathers 50 or so years of slides. As I import the images by scanner (it takes about one full day per year of slides) I can see and partly correct for the ravages of time. The oldest albums now fit onto a single CD and allow much better viewing than the originals. Even the slides from the 70s and 80s have significant color shift that can be relatively well corrected by simple digital tools. Once in digital format, aging stops.

I can and will organize these archives into CDs and distribute them to the family members pictured. This reduces the probability that an emergency such as a fire would wipe out the whole set and allows people to easily view the images without having to drag out a slide projector and get the slide books sent to them. Consider the cost and time involved in copying several thousand slides and prints.

The problem of not being able to read the media is really not a problem if anyone of the recipients of the CDs cares about preserving the photos. As media become obsolete, computers with both old and new hardware will allow rapidly migrating the content to the new media. My company has been building computer based scientific instruments and we still have systems that with some effort can extract data from 8" CPM floppy disks.

Bruce McIntosh

CDs age, too (see Mr. Depew's letter), and they remain dependent on an elaborate and fragile infrastructure. Your confidence that old media will be quickly and easily transferable to new is not supported by my experience. I'm glad you're happy with your digital pictures, but if the infrastructure ever does collapse—a remote but real possibility—I'll still have my pictures and you won't.

***

Dear Mr. Schmidt;

I found your comments on the dangers of dependence on widespread fragile infrastructures quite pertinent.

I don't know what can be done about the Internet, but widespread dependence on the power grid is about to end.

Some years ago, you ran an article called "Paradigm Shifty Things" which mentioned a company named "Blacklight Power" (blacklightpower.com) who claimed to have a process using "subnuclear" reactions to generate heat, using hydrogen obtained from electrolyzing water, plus a catalyst (argon with a trace of oxygen). I have followed this company closely ever since (I even attempted in 1998 to invest in it, but the private stock offering was oversubscribed by the time I found out about it.) and can report the following:

In 2000 they announced the development of a low temperature (3000 degrees K ignition point) plasma reaction using their process. At that point they announced they were dropping their plans to develop a heat engine (turbine) electric generating system for use by large power companies in favor of a small home generating system.

They developed a system using a klystron to extract electricity directly from the plasma. (Note: this is *not* a hoax!) They were initially very vague as to the time frame for release of a commercial product, and continue keeping a very low profile.

Last month they announced that:

1. They have a working prototype of a home power-generating device.
2. They will market a home heating system starting in 2006.
3. They will begin marketing a combination home heater/electric generator in 2007. (Also the generator without the heat feature.)
4. They expect automobiles to be on the market by 2008 or so.
5. The price for a 25kw home unit should be under $2000.

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6. Respected independent testing laboratories, including a government facility that otherwise works only for the government, have fully confirmed the test results proving the system works as they say it does.

Rowan College in NJ recently completed a NASA study of the Blacklight Power process as a propulsion system for small satellites with a very favorable report.

What all this means to the world economy is left as an exercise for the student.

Full details of the theory, process, and laboratory confirmations of the process are available at their website, so I won't go into the details here except to add that the process emits no ionizing radiation, occurs at below atmospheric pressure, and emits a harmless but commercially valuable form of hydrogen as the only waste product.

I have been a subscriber to *Analog* since 1966, and always enjoy it, especially the science articles and your editorials. Keep up the good work.

John P. Wren

Good news if true, thought the transition itself would be a challenge. And we've heard enough claims like this before to say, "We'll wait and see."

Dear Stan,

Your editorial was on point except for a couple of assumptions that may not hold up.

First of all, humans are about as likely to go without electricity for about as long as they'd go without fire. The power grid is nothing but convenient "fire" . . . tamed for various purposes. I'm sure somebody complained that paper was far more ephemeral than stone tablets (and they were right, as evidenced by the Library at Alexandria). One trades strength for convenience . . . but on the other hand, there can be literally billions of precise copies of digital images, making their loss even less likely than a few hardcopy prints. Time will tell if the trade is worthwhile, but I think printed books vs. carved tablets proves the value of redundancy both for access and archival availability.

The second point is that systems are "alive" in every sense. The power grid has evolved into the current state of availability by demand. If everybody needed absolutely reliable power all the time, it would have evolved to that state because anything less would be intolerable and it would fall out of use or be replaced by something that meets the need.

Loss of power is inconvenient, but not nearly as inconvenient as the loss of prepared foodstuffs at the local grocery store. Lose power and you might need to start a fire. Lose food and what are you going to do, suddenly learn to plant cows?

Infrastructures are integrated because it's cheaper, not because it's better. Cheaper (outside of the profit motive, not a bad thing) means more goods for the available price and more availability.

Immense infrastructures are, as you described, necessary for centers of population like New York City. But if you scale that thought a bit, the infrastructures needed to support countries are more due to all the mouths that need feeding than anything else. If one reduces the population of the US to 30 million from 300 million (and the world from 6 billion to .6 billion) a lot of the current problems vanish. The problem isn't too much integrated infrastructure , the problem is the driver for that infrastructure—mouths to feed and shelter.

One need not favor population control to be a proponent of some human growth abatement (anything that results in a non-rising rate of growth). I've seen too few calculations for the greenhouse gasses emitted by the human population of the planet, probably because it's a lot easier to demonize cattle than countrymen.

Dave Byrd

Population is the central problem, and the one that hardly anybody wants to face! ■

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UPCOMING EVENTS Anthony Lewis

1–3 October 2004
ARCANA 34 (Twins Cities SF conference) at Holiday Inn Express-Bandana Square, St. Paul, MN. Guest of Honor: Tim Powers. Registration: $35 at door. Info: Arcana 34, Box 8036, Lake St. Station, Minneapolis MN 55408; (612) 721-5959; rekal@prodigy.net;

1–3 October 2004
CONTEXT 17 (Columbus area SF conference) at The Ramada Plaza Hotel & Conference Center, Columbus, OH. Guest of Honor: Connie Willis. Info: Context, Box 163391, Columbus OH 43216; (614) 889-0436; (614) 889-1930 (fax); contextsf@yahoo.com; www.contextcon.com/contexthome.htm.

8–10 October 2004
ALBACON 2004 (Albany area SF conference) at Crowne Plaza Hotel, Albany, NY. Guest of Honor: David Drake. Registration: $50 at door. Info: Albacon 2004, Box 2085, Albany NY 12220-0085; chair@albacon.org; www.albacon.org

15–17 October 2004
CAPCLAVE 2004 (DC area SF conference) at Tysons Corner Marriott, Vienna, VA. Guest of Honor: Nick Pollotta. Artist Guest of Honor: Butch Honeck. Fan Guest of Honor: Dennis McCunney. Registration: $35 in advance. Info: Capclave 2004 Registration, c/o Lee Gilliland, 4030 8th St. South, Arlington VA 22204; leeandalexis@hotmail.com; www.wsfa.org/capc04/

15–17 October 2004
CONS*STELLATION XXIII: DELPHINUS (Alabama SF conference) at Holiday Inn Express, Huntsville, AL. Registration: $30. Info: Con*Stellation, Box 4857, Huntsville AL 35815-4857; ; www.con-stellation.org

15–17 October 2004
VEGACON (Nevada SF conference) at Plaza, downtown Las Vegas, Las Vegas, NV. Guest of Honor: Steven Brust. Filk Guest of Honor: Kathy Mar. Registration: $35 until 1 October 2004, $45 at door. Info: VSFA, 2800 Las Vegas Blvd. So., Suite 11, Las Vegas NV 89109; info@vegacon.com; www.vegacon.com

22–24 October 2004
MILEHICON 36 (Denver area SF conference) at Marriott Southeast, Denver, CO. Guests of Honor: Charles de Lint, Elizabeth Moon, Fred Saberhagen. Artist Guest of Honor: Bob Eggleton. TM: Robert Vardeman. Registration: $32 until 10 October 2004, $35 at door. Info: MileHiCon 36, Box 101322, Denver CO 80250-1322; (303) 657-5912; lindanel@ix.netcom.com; www.milehicon.org

22–24 October 2004
VALLEYCON 30 (North Dakota SF conference) at Fargo, ND. Guests of Honor: Terry Brooks, Ben Bova, Boris Vallejo, Julie Bell. Info: ValleyCon, Box 7202, Fargo ND 58106; conchairs@valleycon.com; www.valleycon.com ■

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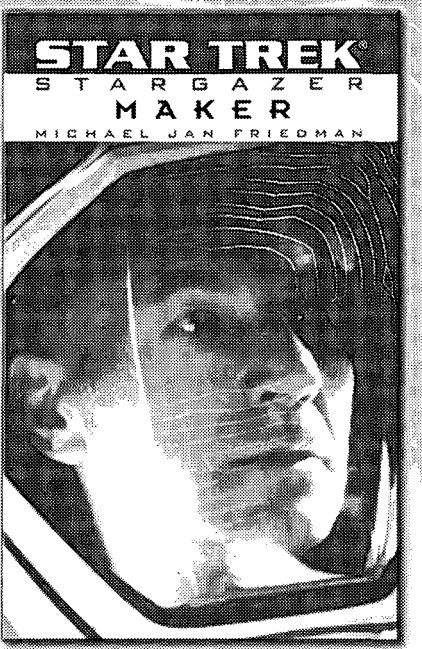

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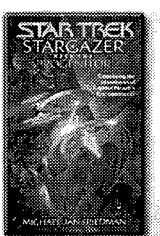

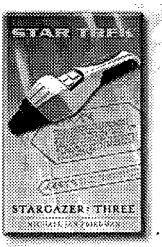

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